WOOD WORKING Digest

NOV. 1954

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WOOD WORKING DIGEST

222 E. Willow Ave. Wheaton, Ill.

Form 3547 Requested Return Postage Guaranteed

UNIVERSITY MICROFILMS
ATT MR EUGENE B POWER
313 NO FIRST ST
ANN ARBOR
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A HITCHCOCK PUBLICATION

Stop the clock!

on production losses!

with a

BERTHELSEN PRESS

and **INTEGRAL LOADING TABLES**

High production yield from a hot plate press is only half solved when curing time is cut to a minimum . . . for cure doesn't begin until the load is in the press. By installing a Berthelsen single or two opening press with **INTEGRAL LOADING TABLES** you gain two important production advantages:

1. **EFFICIENT LABOR UTILIZATION**
   Press crews maintain an even work pace, assembling each new load on the loading tables while the load in the press is curing. When cure is completed, the tables automatically discharge the cured load and position the new load in the press. Handling of material is cut to a minimum and handling of hot cauls is eliminated.
2. **GREATER PRODUCTION PER OPENING**
   Press idle time between charges can be cut to as little as 15 seconds enabling press to operate at capacity production. The greater output thus reduces unit costs and increases profits.

BERTHELSEN INTEGRAL LOADING TABLES . . . are just another reason why **BERTHELSEN PRESSES** are the **pace setter in precision press engineering.** Write today for an engineered analysis of your problems. It costs you nothing and can save you much.

BERTHELSEN PRESSES

P. O. BOX 1423 • LOCKPORT ROAD • JOLIET, ILLINOIS

"OLIVER" No. 299
will plane your work fast... and extra smooth

- Built-in Jointing and Grinding Rig
- Variable Feed Rates with Indicating Dial
- Ball bearings on all rotating parts
- Convenient, centralized controls
- Quickly and easily adjusted
- Compact—takes 3' x 4' floor space

Planes stock up to 24x8 in. —40 ft. a minute

This popular "Oliver" Surfacer turns out accurate, smooth work. It feeds stock at any rate from 18 to 40 feet a minute by the turn of a dial. Its one-piece base casting assures rigidity and lasting alignment of all working parts. Though it takes only 3 x 4 feet floor space, it weighs almost 3000 pounds. Revolving parts are fully enclosed to exclude dirt and provide maximum safety. The built-in knife grinding and jointing rig is another valuable feature. Adjustments are made from outside of machine. Has most efficient lubricating system. Unit system of construction. Write for Bulletin No. 299.

OLIVER

OLIVER MACHINERY COMPANY

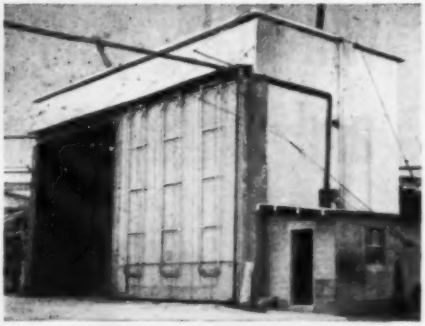
Established 1890

GRAND RAPIDS 2, MICHIGAN

READ WHAT THEY'RE SAYING ABOUT

Standard

PACKAGE KILNS!



C. B. STEM, President of CHESTER B. STEM, Inc.
Manufacturers of **VENEERS AND LUMBER,** American Walnut - White Oak
Mahogany - **New Albany, Indiana**

Writes: "We are glad to report that we have had very satisfactory service from our STANDARD package kilns. So much so that we are now ordering a third and larger kiln from you. In the 3½ years we have used STANDARD kilns, we have kiln dried a great deal of expensive lumber such as Walnut, rift Oak, quartered Oak, Honduras Mahogany, African Mahogany, Cherry, etc. We can truthfully say we have had no difficulties whatsoever and we have received no complaints from any of our customers concerning lumber dried in these kilns. That in itself should tell the whole story."

Manufacturers of Internal Fan Kilns

Write for free illustrated Standard Catalog

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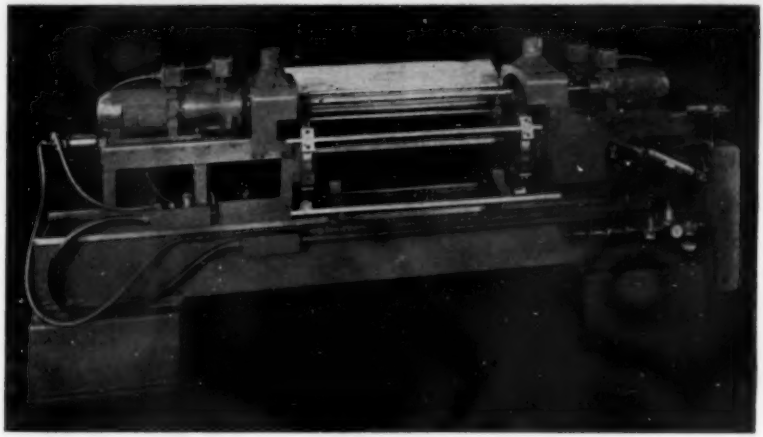
Engineers and Manufacturers Since 1927
DRY KILN COMPANY

798 S. HARDING ST. . . . INDIANAPOLIS 21, IND.

BRANCH OFFICE: REDMAN ENGINEERING SERVICE • HIGH POINT, N. C.

HAWKER'S **new** ROTARY FEED MULTI-PURPOSE MACHINE TOOL



Do any 6 of these operations in one pass through a Hawker!

(more with dual-purpose chucking heads)

CUT TO LENGTH
CROSS-BORE
BORE
COUNTER-BORE
TAPER
TENON
SLOT ENDS
THREAD EXTERNALLY
THREAD INTERNALLY
ROUND ENDS

Six operations automatically

on each workpiece in one pass through the machine. Rotary feed to chucking heads means "no lost travel time." Chucking heads work continuously.

Round, square, rectangular stock

automatically hopper fed. Positive centering of workpiece. No improper or off-center chucking. Production up 2,500 units per hour.

Standard chucks—minimum set-up time

lets you use standard chucking heads—individual chucking head motor mounts are interchangeable for quicker set-up—faster alignment for changes in operation.

Get in touch with Hawker today!

for the full story on this and other new Hawker production machine tools for the woodworking industry.

HAWKER **MANUFACTURING CO.**
1449 KEOWEE ST., DAYTON 4, OHIO

MACHINES FOR THE NEW AGE OF WOOD

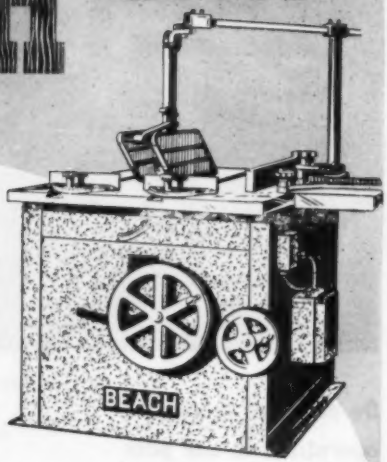
SPECIFY

BEACH

tilting arbor

SAW

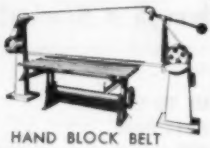
- for ripping
- cut-off
- dadoing



Beach Tilting Arbor Variety Saws are available in 4 styles for dependable, high precision cutting.

Model 800—with rolling table, 27" travel
Model 801—with 4', 6' or 8' extension on one side
Model 802—with 4', 6' or 8' extension on both sides
Model 805—with stationary iron top

- Vibration-free frame gives smoother performance; greater accuracy on heaviest work
- 48" x 80" table size with standard cut-off gauge, mitre gauge and bevel ripping gauge
- Built-in 5 H.P. ball-bearing, 2 or 3 phase motor
- Tilting mechanism insures perfect alignment
- Built-in steel dust collector
- Adjustable saw guard and splitter



HAND BLOCK BELT SANDER

WRITE TODAY for complete information and specifications on the Beach Tilting Arbor Variety Saws!

DOUBLE CUT-OFF SAW

SHAPER

TILTING TABLE SAW

BEACH
MANUFACTURING CO.
MONTROSE, PA.

WOOD WORKING Digest

NOVEMBER, 1954
Vol. 56, No. 11

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BPA

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SUPER MOHAWK
SUPER HIGH-SPEED STEEL
KNIVES

use when ordinary high-speed steel isn't good enough

SUPER MOHAWK steel is the woodworker's choice for that critical class of cut that is too rugged for high speed steel but does not warrant the expense of carbide steel knives. Here is the knife specifically engineered for maximum production in cutting hard woods, glue joints and many difficult jobs . . . And it can be ground with the same equipment used to sharpen ordinary high speed steel knives.

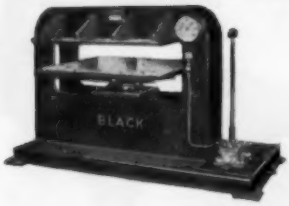
WRITE for COMPLETE CATALOG

THE WAPAKONETA MACHINE CO.

WAPAKONETA, OHIO

Knives Engineered for the Job Since 1891

Presses

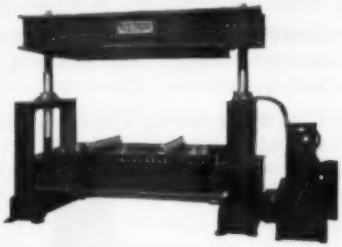


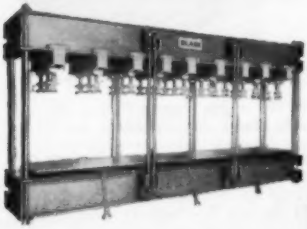
HYDRAULIC PRESSES

Black's hydraulic laminating press is designed for laboratory and experimental work or light production operation. Standard sizes from 1 to 12 or more square feet and pressures up to 100 tons. Now available with heated platens. Variations may be had in size of platens, vertical opening, length of stroke, total pressure applied, heated platens and fast closure arrangements. Write for Bulletin 11-P.

ELECTRIC PRESSES

Black's electric press is fast and efficient on laminating jobs which require moderate pressure, and has proved to be especially popular in the laminating of flush doors and plastic laminates. Here is a high production press at a low initial cost which will give continuous service with an irreducible minimum of maintenance and attention. Write for Bulletin 11-E.





HAND POWERED PRESSES

Black's all steel aircraft model press is stronger and more rigid than conventional presses . . . has wide flange main beams, double corner posts and multiple strain rods. Designed for compact installation requiring no blocking or pit. Offered in a complete range of sizes for every conceivable requirement. Also ten sizes of sectional press units are available. Write for Bulletin 11-G.

"If its gluing equipment—we have it"

write today . . .

THE BLACK BROTHERS CO., INC. — 820 9th St., MENDOTA, ILLINOIS

Two Tools in One...
The Stanley Overarm Router

IT'S A ROUTER . . . IT'S A SHAPER

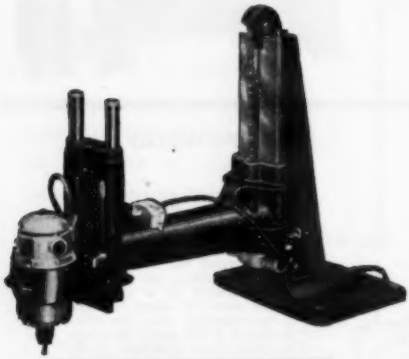
And what an efficient combination these two make in your shop! Compare these Stanley features—

DIRECT DRIVE — no belts, pulleys or gears.

18,000 R.P.M.'s — chatter-free cuts — clean surfaces that need no hand finishing. 1 h.p. motor has power reserve for the toughest jobs.

CONVERTS TO SHAPER — motor can be secured in cradle beneath table for use as shaper easily and quickly.

Cuts wood, plastic, aluminum and other non-ferrous metals.



No. 103 — Combination router and shaper with base and table.

No. 101 — For shops with a sturdy bench for mounting.

It will pay you to check further on this versatile, rugged power tool. Write to Stanley Electric Tools, 433 Myrtle St., New Britain, Conn.

STANLEY® Electric Tools

A Division of The Stanley Works

TOOLS • ELECTRIC TOOLS • HARDWARE • STEEL • STEEL STRAPPING

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If you Plan Ahead Today—
with these
2 New Production Stars
by WHITNEY

206 Six-Roll Single Surfacer
A heavy duty, 6-roll surfacer for highest quality rough or finish planing. A production line quality planer built to Whitney high standards of accuracy. You haven't seen the ultimate until you have seen the new Whitney 206.

589 Single Spindle Shaper
A high precision shaper of heavy duty design. Motor driven belted spindle for smooth, accurate, high production service. New construction features throughout for more economical operation.

★ **NEW DESIGN!**
★ **NEW SPECIFICATIONS!**
★ **NEW FEATURES!**

You don't have to be a fortune teller to find out how Whitney can fit into your production future. These completely new production machines are designed for increased efficiency, smoother operation, faster feeds, easier handling of stock. For more profits in 1955 and the years to come, now is the time to have your planning engineers look into their crystal ball.

You may be paying for new machines thru a poor quality of work, inefficient operation or excessive rework. See these two new production stars by Whitney today. Don't delay. *Write, wire or phone* us for complete information. BAXTER D. WHITNEY & SON, INC., Winchendon, Mass.

Whitney
FOR FINEST PERFORMANCE

117 YEARS OF EXPERIENCE AND KNOW-HOW

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ONLY NATIONAL OFFERS A COMPLETE LINE

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Single-Pad . . . Air Driven

STRAIGHT LINE
ACTION

MODEL 300
Two-Pad . . . Air Driven

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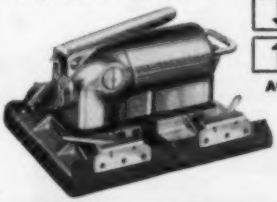

MODEL 400
Single-Pad . . . Air Driven

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Single-Pad . . . Electric

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EASILY ADAPTED TO YOUR FINISHING METHODS

NATIONAL NS SANDERS

National Sanders can be adapted to your present finishing methods to speed production and yet give your product a distinctive appearance. We offer a wide selection of block sanders, one of which will fit your requirements. Whether you prefer orbital or straight-line action, single or double pads for rubbing or sanding, there is a National Sander for you.

Write for Catalog today!

NATIONAL AIR SANDER, INC., 2822 Auburn St., Rockford, Ill.

"You can *always* count on quality work!"

With Jones & Orth cutter heads on the job everybody concerned is happy with the results — including the customers of the plant!

Jones & Orth users find that it is no trick at all to turn out a large daily output of consistently high quality, true-to-pattern work — with a minimum of maintenance and servicing expense.

Jones & Orth H-type cutter heads, such as the model illustrated, are unsurpassed for simplicity of design, perfect take-up for wear without change of pattern, and over-all economy. May we tell you more?

Write today for new catalog, and name of our dealer near-est you. Address either our Seattle or Memphis branch!

Need specially designed cutter heads? Let our engineers help! Write us in detail. Prompt service!

JONES & ORTH

CUTTER HEAD COMPANY

385 SOUTH MAIN STREET
MEMPHIS 3, TENN.

BOX 3044
SEATTLE 14, WASH.

Don't be a slave to high tool grinding costs...

Switch to the REDCO TOOL GRINDER *and Save up to 35%!*

Here's the Redco Tool Grinder equipped with the profile knife grinding attachment.

Accuracy, versatility and simplicity—they're the three key words that best describe the Redco Tool Grinder... the grinder that produces cost savings up to 35%.

It's accurate . . . capable of grinding within .001" tolerances.

It's versatile . . . equipped with the proper attachment it resharpens carbide tipped cutter heads, router bits, saws, grooving cutters, and other woodworking tools—makes and resharpens high speed steel and carbide tipped profile knives.

It's simple to operate... reference keys and index plate assure correct cutting angles and precision finishes. After a brief training course—given free at Redco—any normally skilled operator can keep your production tools in tip-top condition.

Don't be a slave to high tool grinding costs—*switch to the Redco Tool Grinder and save up to 35%!* Write today for all the facts.

REDCO

TOOL DIVISION
RED LION CABINET CO.
RED LION 3, PA.

Details of counter top construction:
1/16" HIGH PRESSURE PLASTIC VENEER
"PENACOLITE" ADHESIVE
STEEL DOWEL (TO ALIGN ADJOINING SECTIONS)
1/32" PLASTIC VENEER BACKING SHEET
WATERPROOF EXTERIOR GRADE 9-PLYWOOD

Bonding wood to plastic with PENACOLITE® ADHESIVE gives counter tops extra durability

● To assure maximum ruggedness and lasting good looks, the Bastian-Blessing Co., Chicago, leading manufacturers of fountain luncheonette equipment, top their counters with a thin sheet of tough plastic veneer. And to assure a strong, waterproof bond, they use "Penacolite" Resorcinol Adhesive.

These versatile Koppers Adhesives are ideal for wood bonding jobs from diving boards and ship members to barn rafters and prefabricated homes. And they are recommended for many thermo-setting and thermo-plastic materials and for natural and some synthetic rubbers.

If you would like detailed information on the various "Penacolite" Resorcinol Adhesives and their advantages in so many different applications, write today to:

KOPPERS COMPANY, INC.

Chemical Division, Dept. WWD-114, Koppers Bldg., Pittsburgh 19, Pennsylvania

PENACOLITE® RESORCINOL ADHESIVES

The original waterproof, room-temperature-setting adhesives

cut costs and increase earnings with

PORTER METHOD ROUGH MILL

here's your guide to reduced costs with conveyorizing that fits any woodworking plant

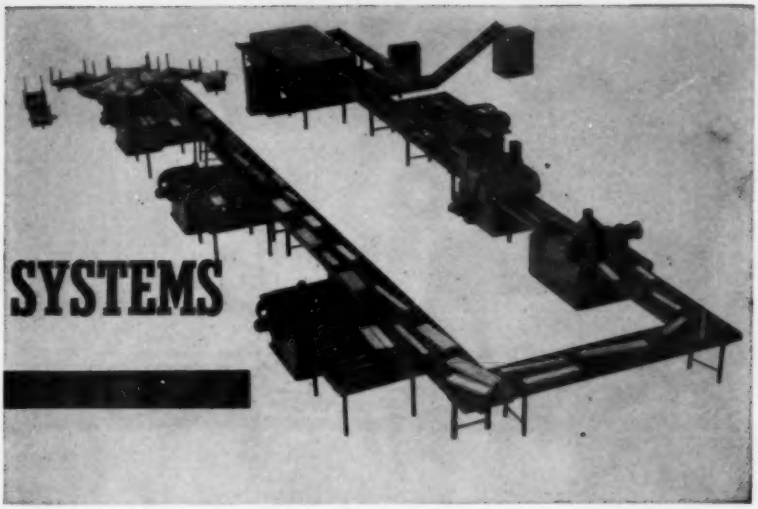
PORTER pioneering
has developed Rough Mill Systems that pay for themselves in economics effected by their installation.

PORTER engineering
meets each particular Rough Mill application. The floor plans of areas allotted for your rough mill operation, plus available machines are all that PORTER needs to make a proposed layout.

PORTER construction
PORTER SYSTEMS are rugged in construction. Formed channels are 3/16" steel, belt plates are 12-gauge steel; conveyor legs are 2" steel pipe — adjustable for height. Belts are top quality. Drive rolls operate on precision ball bearings. Motors equipped with overload relays and disconnect switch for protection of operator and motor.

PORTER service
PORTER conveyors move stock efficiently and economically between your machines, for maximum output. Your PORTER engineer is your constant consultant.

PORTER savings
Man-hours saved with the PORTER METHOD and equipment for Rough Mill operations are of primary interest to production-minded executives.



and here's a typical set-up that frees nine out of sixteen men in a rough mill operation!

This PORTER METHOD Rough Mill set-up conveyorizes corners to save space, frees nine out of sixteen men for other work.

Management's problem today is to reduce production costs. PORTER conveyorizing provides the answer. When you compare the footage to the man-hours required by the PORTER METHOD against the footage to the man-hours required with ordinary methods, you will discover how much more production with less man hours of labor you can gain, and how the total savings will more than pay for the cost of PORTER METHOD equipment.

Send this coupon today for your copy of "More Board Feet Per Day"

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MACHINERY CO.
666 Front Ave., N.W., Grand Rapids 4, Mich.

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666 Front Ave., N. W.
Grand Rapids 4, Michigan

Send my copy of "More Board Feet Per Day".

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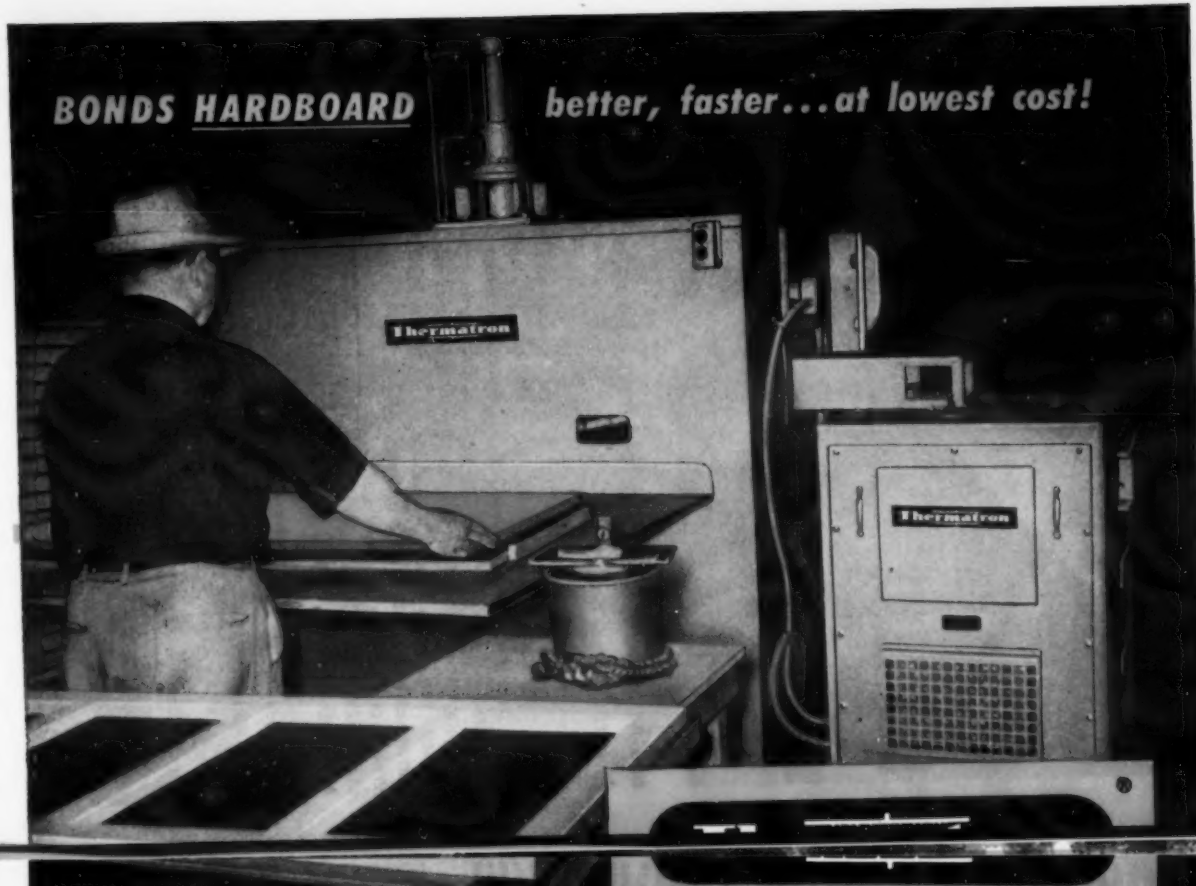
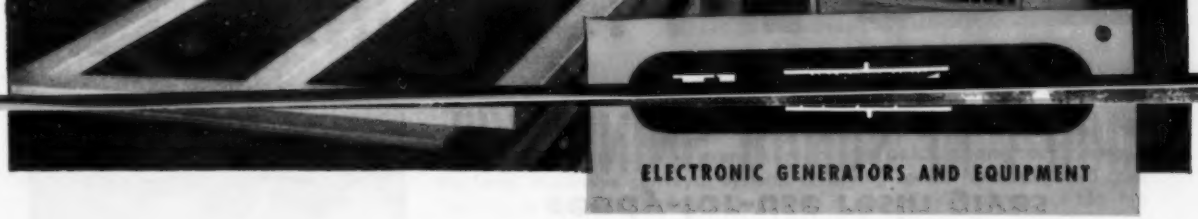

BONDS HARDBOARD
better, faster...at lowest cost!
Thermatron
Thermatron



Tempered hardboard can be successfully bonded with THERMATRON electronic generators and hydraulic presses—combining the best, fastest and most inexpensive method of gluing with the best and cheapest wood-material on the market today! The variety of products is practically limitless with new uses being discovered daily . . . from radio and TV cabinets, furniture and displays *to houses and even vehicles!*

If you're fabricating tempered hardboard or planning to do so let us show how the THERMATRON way of bonding can benefit your production. We'll offer suggestions and application engineering without obligation. Write us today for complete details and ask us for our instructive bulletin no. WD40.

IN RADIO AND ELECTRONICS SINCE 1922

Thermatron *Division*

RADIO RECEPTOR COMPANY, INC.

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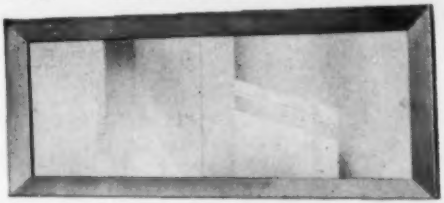
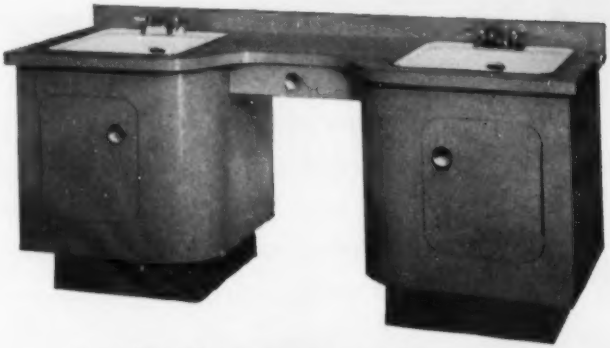
Chicago Sales: 2753 West North Avenue *Factories in Brooklyn, N.Y.*

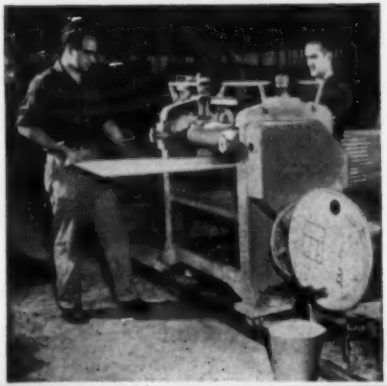
FASTER PLASTIC LAMINATING

KWIK-KLAMP 3048

speeds the mass production of plastic surfaced Vanity Fair bathroom units at National Vanity Co., Kenilworth, N. J.







ready-for-use resin gives

MACHINING BONDS IN 1 HOUR

KWIK-KLAMP 3048 gives handling bonds of plastic to wood in as little

MACHINING BONDS IN 1 HOUR

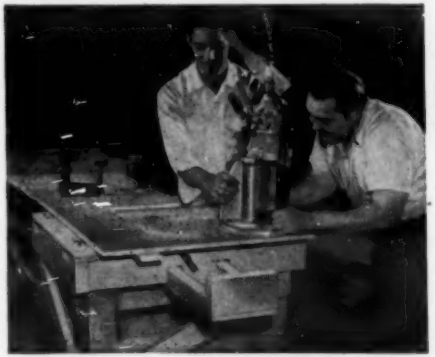
KWIK-KLAMP 3048 ▲

is poured directly from drum and used with no heating or mixing. A light, uniform film, applied by the glue spreader, is all that's needed to laminate plastic to wood.

KWIK-KLAMP 3048 gives handling bonds of plastic to wood in as little as 15 minutes . . . machining strengths reached in as low as one hour. No need for long, expensive conveyor systems or drying rooms for curing. No glue heating or mixing to bother with. Use as is . . . enjoy daylong pot life. No irritating odor . . . cleans up very readily . . . send the coupon.

• • •

RESYN 53R3049 is used by many laminators whose operations are geared to 2-3 hours clamp before cutting. Low cost, moderately fast setting. Resyn 53R3049 makes possible gluing, pressing and machining in the same day.



KWIK-KLAMP 3048

◀ cold-sets in as little as one hour. The bond is then strong enough for machining on the router.

KWIK-KLAMP 3048

is also used for wood to wood bonds, such as cabinet joints. Low pressure clamps in background are removed after only 20 minutes. ▶

RESYNS®

National

ADHESIVES

NATIONAL ADHESIVES (Resin Division), Dept. WD, 270 Madison Ave., New York 16 • 3641 So. Washtenaw Ave., Chicago 32 • 735 Battery St., San Francisco 11

☐ **Send Plastic Lamination leaflet describing the KWIK-KLAMP process.**

☐ **Ship 5 gallons of National KWIK-KLAMP 3048. Bill at quantity drum price.**

☐ **Have National representative call to explain your KWIK-KLAMP production plan.**

Name _____ **Title** _____

Company _____

Address _____

City _____ **Zone** _____ **State** _____

Leitelt Equipment can save many hard dollars in your plant and yard through more efficient lumber handling. For instance, the Leitelt Power Transfer Car operated by one man moves kiln car loads up to 30 tons with ease and safety. One man does a job that ordinarily takes the time and labor of five to eight men. Look around your plant or yard and see how many men are involved in handling lumber. If you are using more than one man or a Transfer Car it's time to call on Leitelt.

SAVE Lumber Handling Dollars with LEITELT

Write for full information on Leitelt Lumber Handling Equipment. We will be glad to advise the correct installation for your particular lumber handling requirements. Every installation pays for itself.

Manufacturers of Lumber Lifts Car Pullers Power Driven Turntables Subcars and Leitelt Swing Tables

LEITELT IRON WORKS
400 Mill St., Grand Rapids 2, Mich.

Notice in the installation below how one man handles a kiln load of lumber. The power Transfer Car does the actual work, whether it's pushing or pulling a load into or out of dry kilns or storage tracks.

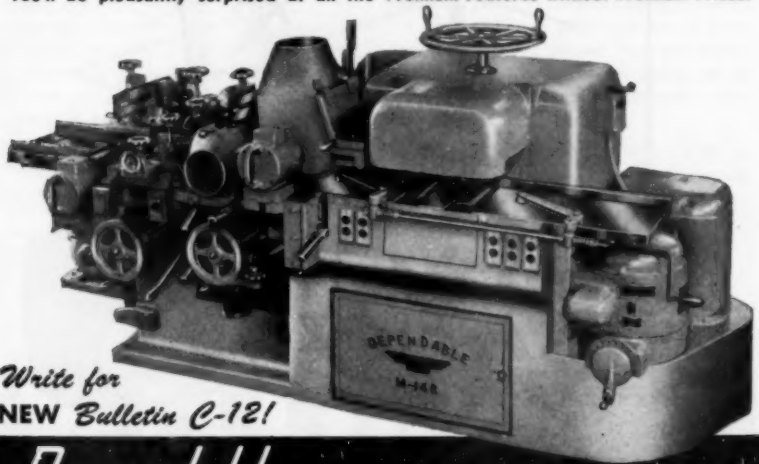
for Smooth Sailing

you want these features in your next moulder!

You want to invest in a machine with the ability to produce results! The Dependable Electro-Unit Drive Moulder will take you through heavy production schedules time and again with these advanced-design features (not usually found on other makes):

1. Variable speed drive; infinite range up to 150 FPM.
2. Higher spindle speeds (5000 RPM is standard) yet standard speed motors are used and frequency changers avoided.
3. Multiple-knife work accomplished with jointing on or off the machine with cartridge spindles.
4. Fewer knives do more and better work at less cost and less maintenance.
5. With extra cartridge spindles, down-time for set-up changes is reduced to a matter of minutes instead of hours!
6. Dependable's compact design saves space; the heavy cast iron base, balanced and ground spindles, ball and Timken bearing construction throughout assure you SMOOTH SAILING in your moulder production dept.
7. Heavy ground steel plate and extremely heavy construction throughout the feedworks assures you many years of production with minimum maintenance.
8. Bearings in motors, spindles, feedworks, and wherever practical are prelubricated, sealed-for-life, or else are running in a bath of oil to assure ample lubrication.

You'll be pleasantly surprised at all the Premium Features without Premium Prices!



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In a wide range of grits and widths for sanding, smoothing, polishing all types of wood products.

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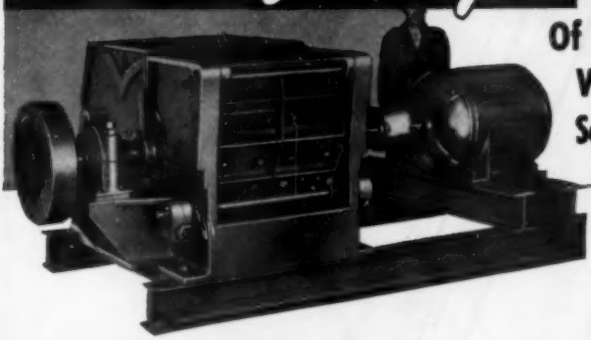
WILLIAMS "No Nife" Hogs

Save Up To 75% Of The Cost Of Handling Wood Scrap!



Handling and disposal expense of waste wood can be cut as much as 75% by reducing it to chips in a Williams Hog. If handled manually, one man alone can move as much tonnage as three men could handle if scrap is in long strips or awkward shaped pieces. If handled automatically, top efficiency can be obtained only if wood is first reduced to chips.

In chip form, waste wood produces the greatest heat value. Unhogged waste cannot burn evenly because jumbled distribution of small and large pieces restricts air flow, smothers the fire, creates excessive smoke. Hogged wood chips control passage of air for even and complete combustion, yield more BTU's.

Savings in a few months will pay for an automatic installation for conveying wood waste to stoker or boiler.

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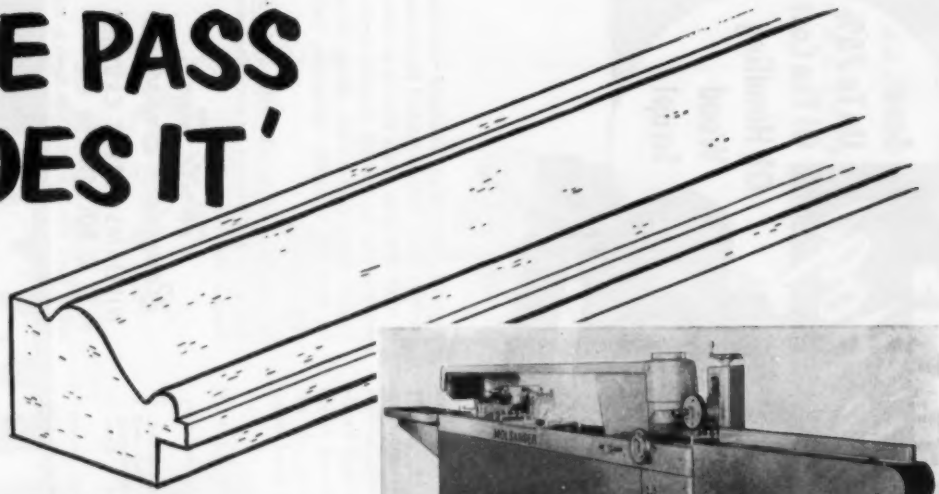
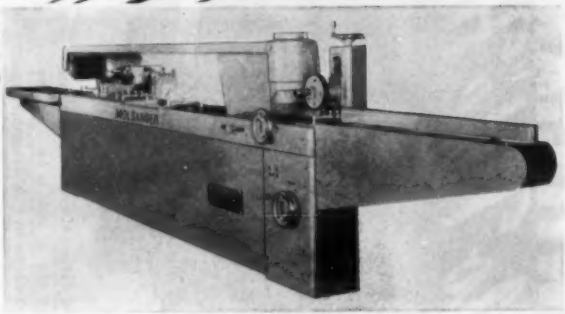
'ONE PASS DOES IT'



WITH THE

MOLSANDER

MODEL 100



High speed sanding production is a must in your furniture plant . . . and the best way to get high speed — highest quality — uniform sandings is with the Molsander Model 100. **With the Molsander, many mouldings** machine. Frame and base is of sturdy steel weldment. For sanding of delicate work, a two-speed sand belt motor with drum control is available. The Molsander can be equipped with either one, two or three heads. Addi-

High speed sanding production is a must in your furniture plant . . . and the best way to get high speed — highest quality — uniform sandings is with the Molsander Model 100. **With the Molsander, many mouldings can be sanded in one operation.** Yes, "One pass does it."

SPECIAL DESIGN

The Molsander is one of the most versatile sanders on the market today. It is a precision built machine designed for the sanding of mouldings. Yet, it does a superior job on bed rails, drawer sides and **drawer fronts.**

PROTECTS STOCK

There's less waste with the Molsander because moulding surfaces are protected by replaceable rubber tires on both upper and lower feed rolls. It will handle work up to 8" wide or 8" high.

SPEED RANGES

Constant feeding is assured because the Molsander is equipped with power driven rubber-covered endless belt, five feet long. Variable speeds range from 20 to 55 F. P. M. with special speed ranges available. Adjustments are made easily and rapidly.

SPECIAL EQUIPMENT

The Molsander is equipped with two electric motors, magnetic starters and push button controls completely wired within the machine. Frame and base is of sturdy steel weldment. For sanding of delicate work, a two-speed sand belt motor with drum control is available. The Molsander can be equipped with either one, two or three heads. Additional heads eliminate extra passes and provide greater variety of sandings.

ADDITIONAL INFORMATION

For full information on how the Molsander can help you speed up production — and improve quality — call or write today. Name of Molsander agent in your locality supplied on request.

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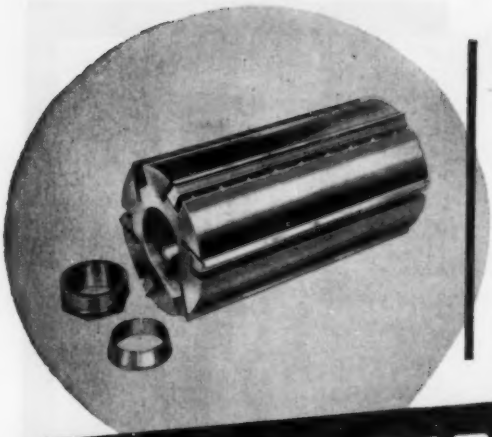

Precision in manufacture and careful heat-treating of the material insures accuracy of performance in these heads. For consistent uniformity and reliability, be sure to buy . . .

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ROUND HEADS *and* SQUARE HEADS

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MACHINERY AND TOOLS SINCE 1904

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A Full Line of Machines with

"BUILT-IN" WOODWORKING KNOW-HOW!

LIGHT-HEAVYWEIGHT
10" TILTING ARBOR SAW

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6" JOINTER

LIGHT-HEAVYWEIGHT
Variable Speed
15" BAND SAW

Additional LIGHT-HEAVYWEIGHTS to round out your woodworking needs: VARIABLE SPEED LATHE—BELT AND DISC SURFACING MACHINES—SPINDLE SHAPERS—NEW 1½ HP RADIAL SAW—JIG SAWS—SINGLE AND MULTIPLE SPINDLE DRILL PRESSES—Bench and Floor Models—COMPLETE LINE OF MOTORS, TOOLS AND ACCESSORIES.

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They're *all* champs at doing your jobs faster . . . more accurately . . . and at lower cost! That's because there's 25 fruitful years of woodworking know-how built into every single one of these Walker-Turner LIGHT-HEAVYWEIGHTS!

You'll find these specialty-engineered machines give you advantages usually available only in larger and costlier equipment—and at prices to fit your budget.

Write us for the Bulletins on any or all Machines listed. Better yet, talk it over with your Walker-Turner Distributor. He's most capable, factory-trained, and thoroughly experienced to help you with all your woodworking (and metalworking) needs. Call him—today.

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KEARNEY AND TRECKER CORPORATION
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DRILL PRESSES — Hand and Power Feed • RADIAL DRILLS • Wood and Metal Cutting BAND SAWS • TILTING ARBOR SAWS • RADIAL SAWS • JIG SAWS • LATHES • SPINDLE SHAPERS • JOINTERS • BELT AND DISC SURFACERS • FLEXIBLE SHAFT MACHINES

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that stay on the job longer

IF IT TAKES THE BEST TO SATISFY YOU

BUY WOODSMAN—*NEW, SMOOTH CUTTING, THIN-KERF,* EXTRA QUALITY *MAGNI-SHARP* BLADE WITH THE *TRUE CARBIDE DESIGN.* YOU'LL GET THE MOST *FINELY-FITTED, LOW COST* CARBIDE BLADE EVER MADE . . . YOU CAN RELY ON NORTH AMERICAN'S *GUARANTEED PERFORMANCE.*

For complete description of each type of WOODSMAN blade and detailed information as to its application, write for our FREE catalog, Data Sheet and Price List.

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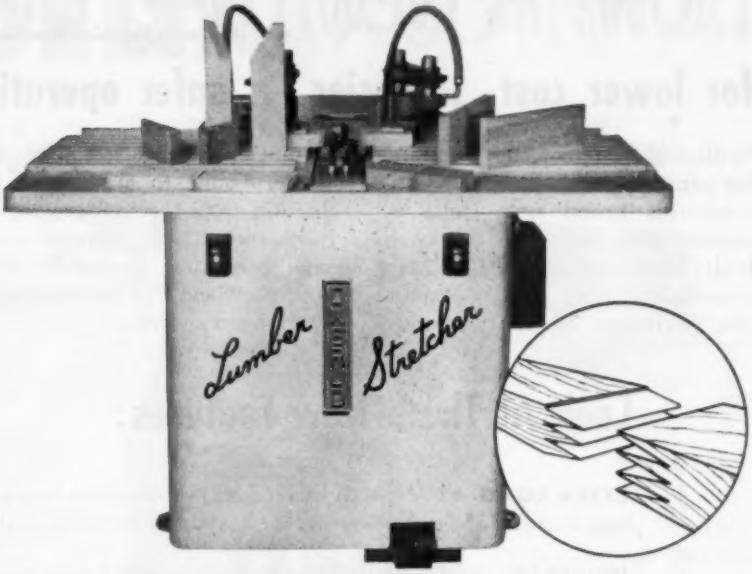
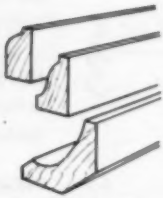
AMERICAN

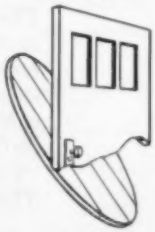
it's like buying wood at 1c to 2c per board foot



with the *new* dual-feed Onsrud® LUMBER STRETCHER



to reclaim dimension lumber, mouldings, cores and paneling of every kind, at 1c to 2c per board foot cost



You can now easily reclaim scrap wood and lumber with the new Onsrud Lumber Stretcher. The only scarfing machine of its kind in the world! Cuts two-ends-to-be-joined at one time, to make a precision, long-finger joint that is stronger than the original wood itself. The material you reclaim is yours for as little as 1c or 2c per board foot. Even fir dimension lumber scrap quickly pays for the machine. Here is one of this year's most outstanding new machines for woodworking. A heavy duty precision unit for all types and standard sizes of wood. Write for complete information and prices.

ONSRUD MACHINE WORKS, INC.

3947 Palmer Street • Chicago 47, Illinois

Now! A New Long Bed

for lower cost . . . easier . . . safer operation

Brilliantly engineered—providing *big* jointer capacity at *small* jointer cost—this brand new Delta 6" Jointer gives you solid Rockwell-built Delta quality, *PLUS* new innovations that greatly expand the flexibility of your jointing-planing operations. It's a big, tough jointer—built to slash your production costs through greater usefulness—built to provide easier, safer operation. Dollar for dollar, your very best buy for general production woodworking.

Look At These New Features:

1. **EXTRA LONG 42½" BED:** Insures a true cut the entire length of a long board. The longest jointer you can buy, dollar for dollar.
2. **UNIVERSAL FENCE ADJUSTMENT:** Single control handle positions the fence for both width and angle of cut. Engage positive 90° and 45° stops at a touch.
3. **IMPROVED TABLE ELEVATING MECHANISMS:** Conveniently located hand wheels, provide quick, easy raising and lowering of each table. With these controls you can't "skin" your knuckles!
4. **NEW SAFETY ENGINEERING:** Newly developed torsion spring assembly makes possible an adjustable tension guard—provides constant protection in any type of jointer work.

The new Delta 6" Jointer provides these outstanding innovations—plus the accuracy and remarkable versatility that have made all Delta Jointers famous! See this beautifully built, cost-cutting Delta 6" Jointer at your Delta Dealer (he's listed in the classified directory under "Tools" or "Machinery") or send the coupon TODAY!

ROCKWELL

DELTA 6" Jointer...

Bench Model
(without motor and stand)
ONLY
$122.50
Western Prices Slightly Higher

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DELTA QUALITY POWER TOOLS

Another Product by **Rockwell**

Delta Power Tool Division,
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"Those blocks have to stay put when they hit the lathe— and they do with Armour Glue!"

John Bruggink, General Works Mgr.,
Phoenix Chair Company, Sheboygan, Wisconsin.

"For our Rathskeller and Clubroom line, we do a lot of leg-blocking. When those blocks hit the Mattison lathe, the glue has to hold them tight or they'll pop—but this new Armour 43H Liquefied Glue holds them perfectly. We also save time and labor because we don't have to mix or heat this liquid glue—it's ready to use all the time at room temperature. Armour glue helps us in gluing seats and panel work, too. It's a superior product!"

All through the woodworking field, experienced men like Mr. Bruggink have good reasons for specifying and using Armour glues. A new, versatile adhesive like Armour's Liquefied Hide Glue can increase production because it's always ready for use—no wasted time in preparing it. And its high tensile strength and consistently high quality mean dependable results on every job.

Armour's Liquefied Hide Glue is only one of a complete line of Armour's woodworking adhesives, including polyvinyl resin emulsions. Write Armour today for current prices of these modern adhesives.

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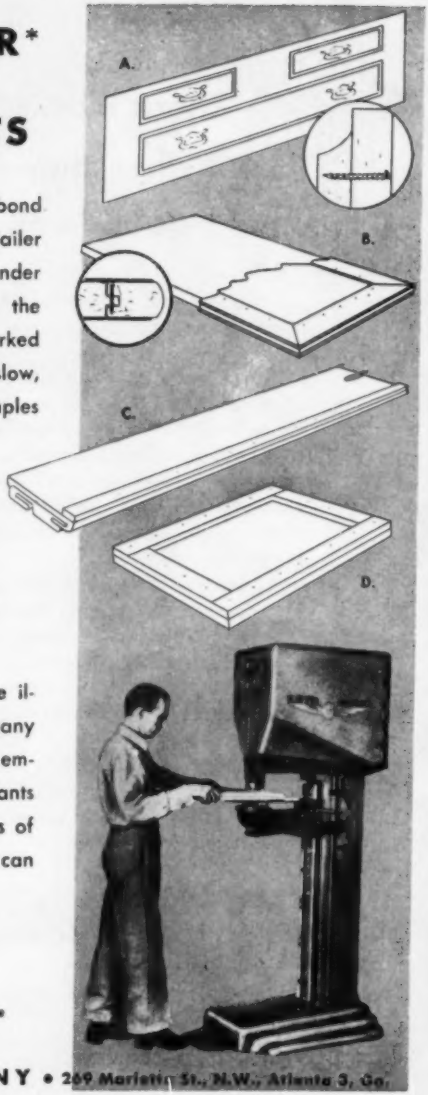
IDEAL FOR
GLUE JOINTS

A tight joint and positive glue bond are assured by using Auto-Nailer because the work is squeezed under 1000 pounds pressure. And the stock can be handled and worked while the glue is setting. No slow, costly clamping. A few examples are illustrated here:



A. Glue-nail false drawer fronts to panels, invisibly.

B. Glue-nail rims to cores.

C. Glue-nail bed-rail slat-bearers.

D. Invisibly glue-nail bands.

We will gladly send you the illustrated book which shows many more practical uses, now being employed by leading furniture plants and others. You will see dozens of ways this versatile machine can save money in your plant.

AUTO-NAILER

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AUTO-NAILER COMPANY • 269 Marietta St., N.W., Atlanta 3, Ga.

It Pays to . . .

MODERNIZE

The need is acute today in many woodworking plants for replacement of old machinery which has outlived its usefulness and is nibbling away profits with slow production and excessive maintenance. However, there is more to be considered than the immediate addition of a planer or a sanding machine. New machinery is essential for efficiency, but most important is a thorough understanding of the job you want to accomplish.

Do you have a goal? A production record or an expansion program you hope to achieve by, say, January 1956? Or are you planning on a monthly or quarterly basis? If you have the long range view, your chances of making lasting improvements are immensely better than the man who plans for only months at a time.

There are questions to ask even before you price new machinery! Where are the production bottlenecks now? What machines are down for repair most often? Where is your greatest labor turnover?

One furniture manufacturer has done a fine job in the last decade by way of plant modernization. And management has found that "the more horsepower per man, the more productive the shop."

But before this firm ever started actual replacement, management answered a great many questions and looked over organization charts and budgets. Route sheets, employee training and quality control were all carefully studied and an over-all job undertaken. For a beginning study, you can use two main divisions: job study and method study. Under job study you will want to break down the details of every job. Then question every detail — why this way? When could it be done? Under method study, you will want to question the flow of work, the materials and machines used and the location of both work and materials.

Modernizing a plant cannot be started one week and finished the next! It requires real study and effort. Often is it advisable to consult with an engineer; machinery manufacturers can be of considerable help. Read the article in this issue "What Can We Afford?"

When one enthusiastic report after another comes back from woodworking plants that have gone through an improvement program, we know it can safely be said, "it pays to modernize!"

E. McDaniel
Editor

ACCURATE CONTROL
for better lumber drying

with the Moore MASTER Recorder-Controller

This single, compact instrument is truly the "master mind" for the dry kiln—it combines in one case four separate controls:

Automatically controls and records temperature at loading end of kiln

Automatically controls and records temperature at unloading end of kiln

Automatically controls and records humidity in the kiln

Automatically controls roof ventilators, conserving steam and fuel

Let the Moore Master Recorder-Controller take the "guess" out of lumber seasoning. Write for information.

MOORE DRY KILN COMPANY

Oldest and Largest Manufacturers of Dry Kilns and Veneer Dryers

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Comments from THE NATION'S CAPITAL

By Arnold Kruckman
Washington Correspondent

The Committee for Reciprocity Information held general hearings in the middle of October to secure suggestions for the possible modification of Article 28 and concessions in the General Agreement on Tariffs and Trade—GATT. Held in the National Archives, statements were made by approximately 40 representatives for different industrial groups. Robert N. Hawes filed a statement as Counsel for the Hardwood Plywood Institute. Incidentally, other representatives appeared for such varied industries as the American Iron and Steel Institute; the Umbrella Frame and Umbrella Hardware Industry; the Clock Manufacturers of America, Inc.; the Pin, Clip and Fastener Assn., etc.

Were we to enumerate the variety of the industries represented, we should see how wide spread is the protest against the unconstitutional use of the General Agreement on Tariffs and Trade by the Executive and by the various Government agencies represented on the Reciprocity Information Committee.

The Constitution of the membership of the Reciprocity Information Committee gives some idea of the Government Agencies which represent the Executive and the Departments. Chairman Edgar B. Brossard of the U. S. Tarriff Commission heads the Committee. Carl D. Corse and Leonard Weiss represent the Department of State; George H. Willis is the member for the Treasury Department; Prentice N. Dean represents the Department of Defense; Harry Shooshan, the Department of Interior. The Department of Agriculture has four members: Robert B. Schwenger, A. Richard DeFelice, Oscar Zaglits and Louise E. Butt. Robert E. Simpson represents the Department of Commerce; Philip Arnow, the Department of Labor, and Katherine Jacobson, the Foreign Operations Administration. Edward Yardley is the Executive

Secretary of the Committee, with an office in the Tariff Commission building.

It should be understood, however, that despite the representation from the various agencies, the Department of State is regarded as the power and the authority of the Committee. Its function is to see that before a trade agreement is concluded with any foreign government it may, at its discretion, present the views of individuals or industrial groups to the public. However, it is not under any compulsion to give publicity to the statements or protests or views that may be filed.

Two subjects were listed for consideration: (1) The general question of modification of Article 28, and (2) possible changes in individual concessions which the United States has received or granted.

In discussing the general question of modification of Article 28 Mr. Hawes said: "The question proposed is whether Article 28, effective July 1951, and twice extended, should be further extended beyond the present extension date of July 1, 1955. As this Article stands at present after July 1, 1955, any country may withdraw tariff commitments with regard to any particular product. Until then withdrawal of tariff concessions may be made only under the escape clause. It is proposed that there be a further extension so that concessions be bound for a period beyond July 1955.

"The domestic hardwood plywood industry has been seriously damaged by the concessions granted on hardwood plywood under GATT, and therefore must oppose an amendment which morally, if not legally, commits the United States not to unilaterally withdraw the concessions on hardwood plywood.

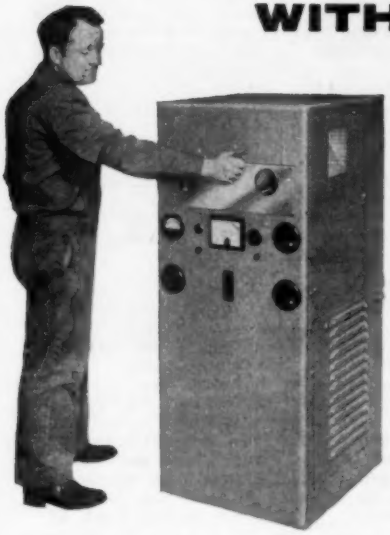
"The legality of GATT is subject to serious question. It has been represented by the State Department that GATT will be submitted to the next Session of Congress. Upon such submission Congress will determine whether or not the United States shall be a party to GATT. If membership is authorized, Congress will fix the conditions under which membership could be effective. A modification of Article 28 should not be made until Congress determines the question of whether or not the United States shall become a party to GATT. To modify Article 28 prior to consideration of GATT by Congress would be an invasion of the legislative freedom of Congress. In substance, such action would be an effort to tie the hands of Congress so that Congress would either be forced to accept GATT for the period of extension of Article 28, or accept the burden of rejecting a foreign agreement and the consequent political repercussions.

"We are of the opinion that Congress alone has the Constitutional authority to fix tariffs. The attempt to bind tariffs in derogation of this power is illegal and an usurpation of authority by the Executive Branch. If GATT is submitted to Congress and adopted under appropriate legislation, the legal question will be resolved. The proposal to amend Article 28 at this juncture is inadvisable, improper, inappropriate and of questionable motive.

Modernize

FOR LOWER COSTS WITH...

Thermex
ELECTRONIC BONDING EQUIPMENT



THERMEX 3KW Bonding Equipment. Compact and portable. Time is saved by a dual-load switch . . . while one load is being bonded, the other can be prepared.

IN MANY CASES, a new THERMEX* Electronic Bonding Unit pays for itself from savings in a matter of a few months. Here's how it can save *you* money:

- Cuts bonding and curing time to a few minutes. Saves manhours. Boosts output.
- Reduces floor space about 75%.
- Simplifies dies for short runs.
- Practically eliminates rejects.

A THERMEX engineer will gladly study your operations and make recommendations. Write The Girdler Company, Thermex Division, Louisville 1, Kentucky.

*THERMEX—Trade Mark Reg. U. S. Pat. Off.

the GIRDLER Company

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

Thermex Division

"The unilateral actions of the State Department in the matter of tariffs has severely shaken the confidence of American industry. Previous hearings before your Committee have not resulted in altering pre-determined policy decisions with the result that many feel the sole purpose of your Committee is to authenticate the phrase, 'after public hearings'. It would go a long way to restore the confidence of a large segment of American industry for your Committee to take a strong stand against amendment of GATT pending Congressional approval of GATT."

Mr. Hawes shows that under GATT the United States has granted concessions on hardwood plywood ranging from 5% to 25% to Finland, Sweden, Canada, and France. He emphasizes "as a result in whole or in part of the duty treatment reflecting the trade agreement concessions under GATT at Annecy and Torquay, hardwood plywood is being imported into the United States in such increased quantities as to cause or threaten serious injury to the domestic industry producing a like or directly competitive article". With his statement Mr. Hawes filed a chart illustrating plywood imports for the years 1950-54.

Without question he will be glad to send a copy of the chart to anyone who may be interested. It was compiled by the Forest Products Division, Business and Defense Services Administration, U. S. Department of Commerce from Bureau of the Census data. Address Robert N. Hawes, Counsel for Hardwood Plywood Institute, Barr Building, Washington 6, D.C.

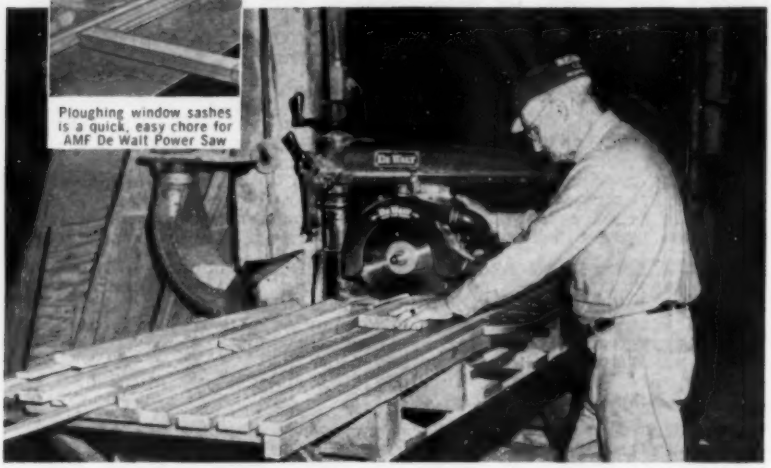
The lumber stain, unidentified, brought to the notice of representatives of southern hardwood lumber people, oak flooring manufacturers, and manufacturers of anti-stain chemicals, at a New Orleans meeting is as yet a complete puzzle to the Hardwood Research Administration Committee of the National Lumber Manufacturers Association. It appeared within the past four years, and thus far has been found in the sapwood of red oak only, the principal species used by the oak flooring industry. It is curious the stain is not discernible on the surfaces of rough lumber, but is very distinct in flooring after surfacing and matching. It occurs in all geographical areas in which red oak grows. It has been found in as much as 20% of oak flooring, degrading select wood down to common. It is estimated that it causes the flooring industry an anuual loss of a million dollars.

Russell C. Flom of Menasha, Wisconsin, has been appointed Director of the Forest Products Division of the Business and Defense Services Adminstration in the U. S. Department of Commerce. He succeeds Bernard L. Orell, of St. Paul, Minnesota. vice-president of the Weyerhaeuser Sales Company, who returned to his company after serving without compensation since last February.

During 1953, according to figures compiled from the Bureau of the Census report, prepared by the Forest Products Division of BDSA, a total of 643.8 million board feet were exported having a value of $64,977,525. These exports decreased in contrast to the figures for 1952 and 1951. The tables as prepared include flooring, ties and shook; another table shows exports of softwood

"Tough interior trim cuts are easy with AMF DeWalt!"

Ploughing window sashes is a quick, easy chore for AMF De Walt Power Saw



That's the good word from Mr. M. S. Morris, Shop Foreman, H. Beckstoffer's Sons, 1209 N. 28th Street, Richmond, Va. He says:

"Yes, whatever we need in interior trim – door jambs, window frames, cabinets, wall moulding – we know our AMF De Walt® will do a top-rate job for us every time.

"In making products like these, we use difficult woodworking cuts like dadoing, rabbeting, mortising and tenoning. AMF De Walt makes them all easily and accurately.

"And if there's a better saw around for cutting-off, beveling and mitering, I've yet to see it.

"AMF De Walt is really tops, especially for interior trim."

Mr. Morris' experience can be *yours* – why not find out how one low-cost AMF De Walt can do dozens of your woodworking operations – faster and safer. See your dealer or write us, C/O Dept. WD-54-11 for full details.

De Walt Inc. Lancaster, Pa.

DE WALT

POWER SAWS

In Canada: De Walt Canada Limited, Guelph, Ontario

lumber by species. The third table show exports of hardwood lumber, hardwood flooring and hardwood dimensions.

President C. D. Hudson of the National Wooden Box Association made the interesting statement that the first public demonstration of a portable nail driver as developed by the Morgan Machine Company was exhibited at the meeting of the East Central Wooden Box Association in Cleveland. The Morgan Company reports that the development of this equipment has extended over a period of more than ten years. An earlier model was marketed for a short time, but was withdrawn when found not entirely satisfactory. Mr. Hudson says the new model is ready for commercial use. The equipment will be exhibited at various shows around the country.

According to Tom C. Mason, Program Executive for Plywood and Fabricated Products, Forest Products Division, BDSA, the U. S. Government now issues daily a publication on all Government procurement known as "Synopsis of U. S. Government Proposed Procurement, Sales and Contract Awards." It is available at $7 per year. Another publication recommended by Mr. Mason is the Commerce Department "Foreign Commerce Weekly."

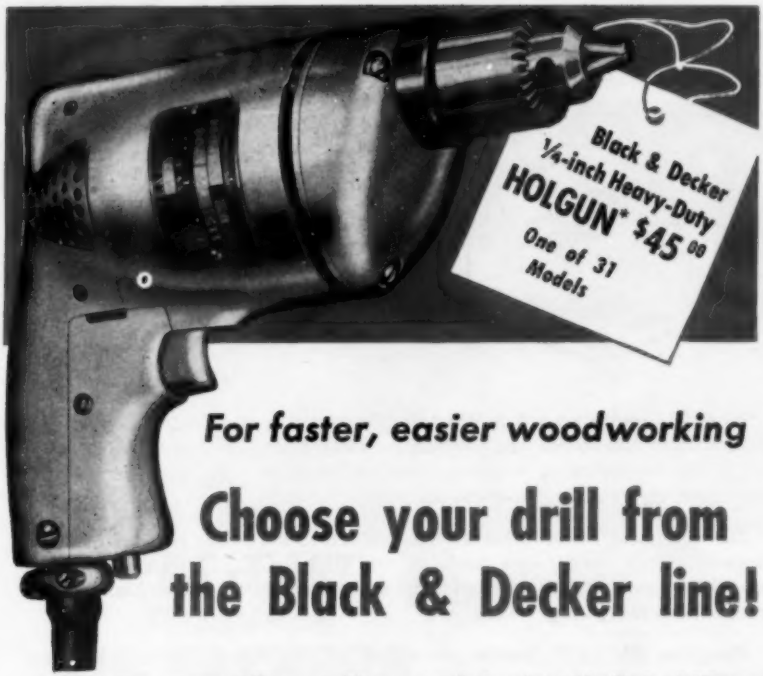
Small Business Administration recently announced it had made a loan of $39,840 to the Geneva (Iowa) Grain and Lumber Company; and $50,000 to Lloyd and Oliver Wilkie doing business as the Livonia Lumber and Supply Company at Livonia, Michigan. The Gateway Corporation of Corinth, Mississippi, broom and mop handle manufacturers, received $35,000; Town and Country Lumber Company, St. Joseph, Missouri, $20,000, and Llewellyn Lumber Company, McKee, Kentucky, $8,400.

George C. Koss is the new President of the Associated General Contractors of America, Inc. He is head of the Koss Construction Company of Des Moines, Iowa. Frank J. Rooney, a Miami, Florida building contractor, was selected as vice-president which means that he will be the president to follow Mr. Koss.

The Bureau of Apprenticeship of the U. S. Department of Labor recently issued a list of 12 groups of industries which have registered apprentices. The total over-all of all apprentices registered was 79,811. The greatest number were the apprentices in the carpenters' trade, 20,541.

The population shift now taking place has two general trends: One from the cities to the suburbs, and one to the West and to the South. It is pointed out by the Bureau of the Census that as people go into the suburbs an amazing number of new schools, churches and shopping centers are built; and, of course, great numbers of homes and apartment houses. Census reports that one-sixth of all non-manufacturing jobs in the whole country are now located in California and Texas; and California leads the nation in the number of construction workers.

The birth rate continues high—one birth every 8 seconds; and there is a death every 19 seconds. Census reports a net gain of new population every 12 seconds. And Census tells us that there are 75 new mouths to feed every morning of the year.



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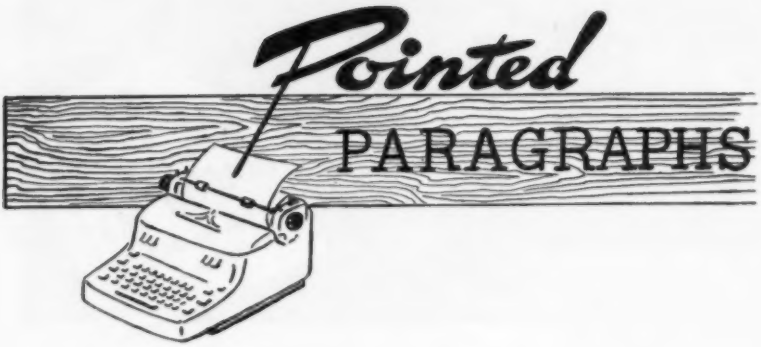

Be sure to read "What Can We Afford?" in this issue of WOOD WORKING DIGEST. Carl Chekouras has summed up some of the questions and answers which the woodworking industry needs to consider. We shall be glad to hear from our readers about this subject.

The "House of 100,000 Ideas" was opened to the public recently at South Norwalk, Conn. Under one roof, on one floor of 7,500 square feet, this new showroom will contain everything that goes into the making of a home from lumber to lighting.

Plans for the 1955 Seattle convention of the Forest Products Research Society are well underway. Dates set are June 20-23, 1955. There will be two-a-day technical sessions, plant tours and boat trips.

About 100 of the nation's leading lumber producers will attend the annual meeting of the National Lumber Manufacturers Association, November 8-10. Theme will be how the lumber industry can boost sales through more aggressive merchandising and greater product publicity.

The National Forecast of the Regional Shippers Advisory Boards is that lumber and forest products, which totaled 575,131 carloads in 1953, will total 581,186 carloads in 1954.

Tree scientists have been crossing, re-crossing and testing hybrids of most of our major forest trees. Today they have hybrid pines, black locusts and chestnuts and hybrid poplars. Now they are ready for widespread testing. These new hybrids, it is said, will grow phenomenally fast and are resistant to diseases and insects. One hybrid poplar only 16 years old stood nearly 80 feet high and 30 inches through.

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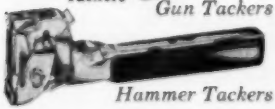

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Also in this issue is the story of Impreg which the Ford Motor Company has used for making die models and patterns to speed production of new cars. The process involves the substitution of laminated and impregnated mahogany board for the plain mahogany board normally used to make the wooden models from which steel production dies are formed.

West Coast Lumbermen's Association tells us that there is a definite renaissance in interest in wood as a decorative material in the modern home. The conclusion was reached after a study of requests for information on lumber from prospective and present home owners.

Over a half a million acres of forest land in western Washington have been infested with the Silver Fir Bark Beetle. This is a serious menace to the commercial forests of the state and potential loss to the economy of the state is in the millions of dollars. So far this year 140,000,000 board feet of trees have been harvested in an aggressive salvage logging operation in the beetle area to lessen the potential loss.

A recent meeting of the National Security Industrial Association's task committee on accumulation, distribution and delivery control covered progress being made on a project concerning storage facilities for lumber in the event of an emergency. The objective of the survey is to provide a private industry stockpile plan which can be put into effect in the case of an emergency. More information is available from the association at 280 Madison Ave., New York City.

Another program under way is research for a process to make finished hardwood veneer more resistant to burns, scratches, alcoholic liquids and other deterioration. More details will be given in a later issue.

Forecasts of 1955 housing output are for a substantial increase. Federal housing officials see a 10% to 20% jump as the direct result of the new housing law. Industry spokesmen forecast from 1.2 million to 1.35 million starts.

The 57th annual convention of the National Hardwood Lumber Association was held at Houston, Texas early in October. T. M. Millet was elected president; Franklin T. Griffin, first vice-president; Howard A. Hanlon, second vice-president and Bernard Bock, third vice-president.

The National Association of Home Builders will hold its eleventh annual convention and exposition in Chicago, January 16-20, 1955. More than 18,000 persons are expected to attend. All exhibit space was sold out early in August.

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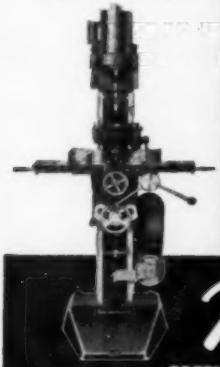

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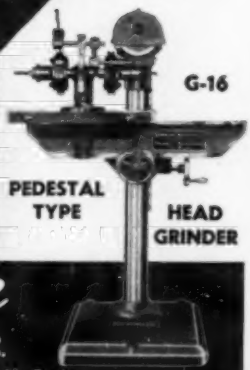

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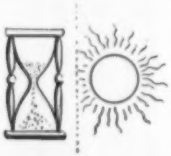

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What Can We Afford ?

By Carl Chekouras

In this article Carl Chekouras asks some thought-provoking questions. Can we afford better tooling? Or should we meet competition with old methods and obsolete equipment? Does machine efficiency cost too much? We shall be glad to answer any questions you may have after reading this article, or to hear your ideas on the subject.

WE often hear a worker complain that he cannot do good work with the tools he has to use. His complaint is equally as justified as the complaint of management: "How can we afford better tooling?" With the high cost of materials added to the high cost of labor the little bit left for profit does not provide much for new tools and machinery.

We agree that the market for wood products has held up, but the consumer's dollar is less plentiful. Every day we read that wood product manufacturers have closed their businesses; if we read no further, it certainly seems to be a discouraging outlook. Yet, in the same publication, we read of additions to plants, new processes and equipment, new products—and other stories of advancement. Somehow conditions always seem to balance themselves and wood products are still being manufactured.

Why is it that one company fails when its competitor succeeds? It is evident that the successful company has devised ways and means to increase output while holding down the cost of labor and material.

Low Cost of Proper Tools

At this point we could question the statement regarding holding down cost of material, for we know that the price trend of material as such is upward. A pine molding manufacturer, in an attempt to hold down his material cost, was trying to buy saws of a thinner kerf. When a carbide-tipped saw was recommended to him, he immediately questioned the loss of material from a wide kerf.

Yet, when asked how much stock he leaves for molding, his reply was ⅛ inch." While complaining about the loss of 1/32" wider saw kerf, he was willing to let ⅛" of stock go up the pipes in shavings.

When using a saw of the proper thickness, either steel or carbide-tipped, a straighter line can be sawed and the material left for clean-up can be reduced to 1/16". For example, the actual measurement of 8" wide S4S stock is 7⅝". The actual measurement of 4" wide S4S is 3⅝". It is obvious in this case that according to the old rule, ⅜" was provided for ripping and planing. Modern machinery does not require such provisions. With proper tooling, substantial savings can be accomplished —savings that will, in a short time, more than equal the cost of the tools.

The Cutting Equipment

A crew of four workers operating and feeding an electric molder was able to produce pine moldings at a feed rate of 73 f.p.m., using a four knife head on a 3600 r.p.m. machine. The cost of a 6 knife head for this operation was $944. This would provide equipment to

accomplish the same job at 112 f.p.m.—an increase of about 50% in productivity.

Let us say that this crew completed 2500 lineal feet of salable molding per day before the installation of the new 6 knife head. Using the same ratio and personnel, the new heads permitted them to produce 3750 lineal feet of molding without any additional expenditure beyond the $944 for the new 6 knife head.

Although the cost of material in this molding operation was proportionately the same, the productivity increased by 50% without any increase in labor cost. How long would it take to pay for the new head at that rate?

And we have not yet even considered the potential production increases which could be accomplished with really modern machinery.

Manufacturing Machines

Replacement of older, less efficient machines is as essential to long range progress as today's profit. When the subject of new machines comes up, the usual answer is, "We can't afford new equipment at this time."

When would be a better time? Today we have good volume without emergency work. Rather than initiate new machine buying when a shop is overloaded, it seems far more advisable to consider such purchases in what we now consider normal times.

Today a machinery manufacturer is in a position to offer better deals and because he is not under pressure he can probably produce better quality. Perhaps the machines built today will be known as pre-war machines in a few years.

Every day we receive advertisements concerning new machines and their advantages. Manufacturers cannot make progress under the theory of the Arkansas philosopher who claimed: "My cabin doesn't leak when it doesn't rain."

The strong, successful businesses are those which have prepared themselves for a competitive economy with better, more efficient, more productive equipment. To quote some authorities: John McCaffery of International Harvester made the statement, "We have to develop better equipment to make them want to replace the old machines. Planned obsolescence is the lifeblood of U.S. business."

Ralph Cordiner of General Electric says, "The chips are down. This year the weak sisters will fall by the wayside."

Our industry has many manufacturers that would fall into the weak sister category. The qualifications for this classification are not necessarily lack of finances, but rather lack of desire to increase profits by doing things in a better way.

In this era we do not depend on our physical strength to accomplish a task. We must have machines to do the work for us. Although a Model T can get us to town, it is definitely not qualified to be considered today's mode of transportation.

Unless the machines that you are now using have been built within the last three to five years, they can be considered obsolete equipment! It costs nothing to call in sales engineers from any of the machinery manufacturers to discuss with you how your production can be increased.

If you had your choice would you rather see your present market price upheld and production increased, or production remain the same and material costs decrease? Remember your product could be considered material and be decreased proportionately.

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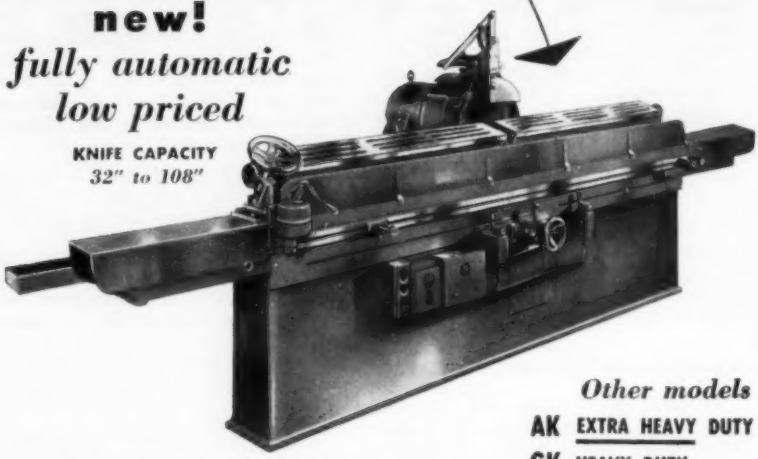

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Evolution of LUMBER DRYING TECHNIQUES and DRY KILNS

Part 12

By Paul H. Graham

SPEAKING before the F.P.R.S. Wood Seasoning committee at Grand Rapids on observations of high-temperature kiln operations visited during a recent European trip, A. C. Knauss, of the Pacific Northwest Forest Experiment Station, commented that most lumber was air dried before kiln drying and was principally 4/4 and 8/4 softwood. Heat used was in a range of 110 degrees C. (230 degrees F.) but without steam injection, and wet bulb control was usually at 90 to 100 degrees C. (194 to 212 degrees F.).

He stated that some kilns seen used a clock mechanism to shut off fans, heat supply and vents automatically so that no operator was required. A wet bulb depression of from 10 to 20 degrees C. was used. Most kilns operated without air being taken in while venting and all kilns operated at atmospheric pressure.

In answer to a question regarding steam consumption, Knauss said that a kiln operated in Finland reported up to 4½ pounds of steam were required per pound of water evaporated from the wood. Most of the kilns he saw were loaded in the morning and were started at noon. No automatic recorder-controller systems were observed in use but portable indicating thermometers were used to measure temperature.

Other observations made by Knauss indicated that most of the lumber dried was used for construction purposes, including lumber for railroad repair use, laminated products, trusses, doors and millwork. Most lumber showed normal shrinkage properties when dried 10% to 14% moisture content. Drying stresses during high-temperature drying of lumber appeared to be relieved as fast as they were formed or generated, much as in American conditioning periods at the end of a kiln run. Reduction in strength in softwoods was not appreciable, but there was from 20% to 30% deterioration in hardwoods. There was little defect damage and what slight discoloration occurred was readily removed by planing.

In a sales presentation the Canadian high-temperature drying equipment, referred to at the beginning of this article, is represented as "the first All Canadian High Temperature Dryer, entirely developed and designed to suit the requirements of the Canadian Lumber Industry" and emphasis is placed upon the fact that all materials and equipment used and installed are of Canadian make and Canadian standards to provide for easy routine maintenance and immediate repair or replacement of parts by plants or local mechanics or electricians.

The high-temperature kiln is described as a chamber or compartment dryer with forced air circulation. Parts are said to be fabricated of aluminum sheeting (97%), air and vapor-tight welded. All structural steel is given protective coatings of zinc coating plus Alu oil paint.

Makeup of kiln and loading capacity of different units are listed as shown in the table.

Front Section (pieces)	Center Section (pieces)	End Section (pieces)	Length	Loading Capacity (B.F.M.)
1	1	1	17'0"	2720
1	2	1	25'0"	4080
1	3	1	33'0"	5440
1	4	1	41'0"	6800
1	5	1	49'0"	8160

This equipment is said to be designed for simple expansion to any desired length and capacity.

The control system consists of wet- and dry-bulb recording controller, control valves, adjustable thermostat and steam spraying system, with all instruments mounted on a one-piece panel. The kiln is insulated with asbestos board covering and Fiberglas insulation, the asbestos board being used for protection against weather, fire, rot and corrosion; the Fiberglas insulation being used for high efficiency in high temperatures, fire safety and rigidity of form.

Aluminum finned coils are used for heating and conventional steam piping for the spraying system. Fans are mounted outside the kiln chamber, as are the air intake, exhaust headers and drain nipples. Butterfly flaps for chain operation are installed in the outflow of the waste steam and/or to admit fresh air when necessary. Electrical heating coils are also available with this kiln but the manufacturer warns that power costs will be from three to five times higher, depending on local electrical power costs.

Installation, it is said, will normally be completed in about four working days. Proper drying schedules suitable to the individual needs are supplied with the kiln.

A discussion of the high-temperature drying process by this manufacturer states: "For proper seasoning of wood there must be a close relationship between the rate of surface evaporation and the rate at which the moisture transfuses from the interior to the surface of the wood. Since the movement of the moisture from the interior of the wood is considerably slower and more complex, the movement of the water to the surface is greatly accelerated by raising the temperature up to 240 degrees F.

High temperature, properly controlled, can be used with safety and the material dries more quickly without degrading. Controlled humidity in drying hygroscopic materials such as wood is of utmost importance. The rate of drying depends upon the capacity of the surrounding air to pick up the moisture, or upon the relative humidity and the temperature.

It will be seen that, if the temperature is raised, the relative humidity is automatically lowered. A rise of 10 degrees F. will cause a relative humidity drop of 25%; a rise of 20 degrees F., a drop

Christopher dry kiln installation features standard Unitemp heating and circulating systems, with direct-fired air heater (gas or oil), axial flow boiler, circulating fans mounted through the roof, and automatic temperature and humidity controls.

of 50% (approximate figures). On the other hand a drop in temperature will increase the relative humidity, while a reduction of the humidity in the surrounding air increases the rate of evaporation of moisture and thus speeds up the drying process. It is on this principle that the operation of this kiln has been engineered."

This kiln is operated with saturated steam at a temperature above the boiling point of water and the condensing point of steam. Notice is called to the fact that saturated steam at any pressure has a definite temperature. Steam pressure required for operation of this kiln is stated to be a minimum 75 lbs. p.s.i.g. Properties of this saturated steam are given as: temperature 320 degrees F., heat of liquid—290 Btu/lb., heat of steam—1185 Btu/lb., and specific volume—4.896 cu. ft. per lb.

Average steam consumption per foot of kiln length is estimated at 31 lbs. per hour maximum and for a 33-foot kiln is estimated to be about 1000 lbs. per hour. With cost of steam estimated at $0.80 to $1.00 per 1000 lbs., applied to a 33-foot kiln with a load-capacity of 5540 B.F.M. operating 24 hours to dry a kiln charge, cost of steam for drying per 1000 B.F.M. is estimated to be about $3.90.

No installations of this kiln are current knowledge of the writer and all information presented was supplied by the kiln manufacturer in a report of characteristics and functions of this high-temperature lumber drying equipment.

The American-made kiln previously cited as being somewhat comparable in circulation and operation to German high-temperature kilns is described as "a fully packaged lumber dehydrator that dries lumber in 1/5th the time, 1/4 the space, and 1/3rd the cost." It is said to work like an air conditioner, dehydrating the wood and leaving it clean, dry and flat. A typical kiln installation serviced by two of these hydrator units is 18 ft. by 18 ft. by 12 ft. high, and operates with push button control.

Air-dried lumber of some species is said to have been dried to 8% to 12% moisture content in 7 hours and green lumber in 24 to 30 hours. Four kiln installations are known to have been made in Maine but direct reports from the users were not available as this article was written.

The heart of the high-temperature drying process developed for drying concrete blocks, previously mentioned, is an automatic steam generating unit which has capacity to produce superheated or dry steam at temperatures as high as 400 and 500 degrees F. under low pressure. The units are so set up, that, initially, the boilers furnish saturated or wet steam to insure correct humidity in the kiln, followed by super-heated high-temperature steam, which is able to pick up moisture within the kiln and do an excellent drying job in current concrete products kilns.

In this concrete block application the kiln is started with saturated steam for 15 minutes, then with the aid of a time clock, switched to superheated (dry) steam for about 1 hour. The saturated steam adds moisture to set up hydration, and the superheated steam then dries the block from the center out to produce a hard, dry block that is cured throughout. Following this, an exhaust fan is operated for about 5 minutes to remove steam from the kiln and the cured blocks are removed.

The units themselves are equipped with automatic controls, safety devices and automatic water feeders to control the quality and quantity of steam produced.

Advice received from the manufacturer states, "Right now these boilers are being tested in wood seasoning applications, the results of which we are not at present able to furnish. However, we can assure you that this method of furnishing steam is one that has multifold uses in the wood drying industry."

The high-temperature drying process has attracted wide attention and is being carefully investigated in countries in which its application has not been used extensively in its present form. Judging from progress to date and the number of variables involved, it would appear that some time will elapse before a comprehensive, accurate evaluation will or can be made.

If the process is found to be suitable for drying North American woods to acceptable standards, which seem to be more stringent than those of European countries, the chief advantages of high-temperature drying would appear to be: fast drying for better flexibility of production, lower dried lumber inventories, fewer and smaller kilns, automatic kiln operation, less discoloration in some species from drying, and fewer drying stresses.

From the American standpoint at least, high-temperature drying appears to be quite an "iffy" proposition at the present time. General efficiency of the high-temperature kiln is still to be proved. Proper techniques for drying to American standards have yet to be developed. Results of comprehensive operational research and specific recommendations remain to be developed and publicized.

All of these things must be accomplished and the reports must be favorable before the American wood industry as a whole will be ready to adopt the high-temperature lumber-drying process.

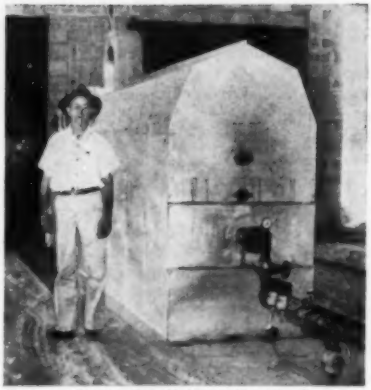
It would appear that it was chiefly economic considerations that provided impetus for the development of direct- and indirectly-heated gas-fired dry kilns. Most of the early development work in this field seems to have been done in the South where dry kiln heating was something of a problem. Dry kiln heating was a problem not only to the small mill operator but also to larger concerns whose plants were operated with gas or oil engines or electric motors were used for power transmission—so that no steam boilers were used.

Those plants which already operated with steam boilers, with waste wood being used for fuel, were able to use this heat source for dry kiln heating with little added expense. At those plants without steam boilers, however, kiln drying consideration usually involved a large investment in dry kiln buildings and additional steam boiler equipment, with its attendant feed water and maintenance problems, and additional cost of keeping a licensed fireman on duty up to 24 hours per day. In many cases just the inconvenience and additional cost of steam equipment was sufficient to keep the small mill from installing a dry kiln.

It is a notable fact that throughout the entire history of their operation, dry kiln manufacturers have been opportunists—quick to adapt themselves to meet any current situation. When it was learned that these problems were curtailing potential dry kiln sales, it did not take them long to set their kiln engineers to work in an attempt to solve these problems. The major problem of dry kiln heating seemed to consist of two considerations: 1) reduction of steam cost, and 2) development of a source of heat, other than steam, for the dry kilns. The first question that had to be answered was "What fuel to use?"

Since natural gas was generally available as an economical fuel in the South, it was only natural that early kiln designs of this period were developed to use gas-fired heating units. These first kilns were of simple design and construction aimed to dry pine with drying requirements that were not too exacting. They were natural circulation kilns with steam coils replaced by large heat exchangers through which the products of the burning of gas was carried.

After these kilns had been operated sufficiently long to indicate that for some uses southern pine could be dried satisfactorily at dry bulb temperatures from 180 to 220 degrees F., without requirement of complex control devices, a trend toward direct-heated gas-fired kiln design was started. From the foundation laid with this early development, many improvements and refinements have been made which have resulted in the modern direct-heated, gas-fired kilns for even precision drying of most wood species.



Courtesy Christopher Unitemp Heating Systems, Inc., Prescott, Ark.

Close-up of Christopher Unitemp Heating System.

As the original direct-heated, gas-fired kiln development was expanded, installations were made principally in those areas where natural gas was available at a relatively low cost and in good supply. Design improvements and modern kiln facilities were added and adapted to better suit these kilns for precision lumber drying.

Modern furnace-type dry kilns feature either direct or indirect heating systems. It is claimed that in either application heat distribution employing natural gas as a heat source can be controlled to a desired degree whether the kiln be of compartment or progress-

ive type. In the direct heating system products of combustion are released into the kiln building. In the indirect system heat from the furnace is carried through a heat exchanger. The heat exchanger is made sufficiently large that the radiation is adequate to maintain the desired temperature.

Modern direct-heated gas-fired dry kilns are available commercially in about six basic classifications: (1) natural circulation kiln, indirectly-heated; (2) natural circulation, directly-heated; (3) forced air circulation, internal fan, indirectly-heated; (4) forced air circulation, internal fan, directly-heated; (5) forced air circulation, external blower, indirectly-heated; and (6) forced air circulation, external blower, directly-heated.

These classifications are derived from methods of heat application and air circulation and are not necessarily used as names of furnace-type kiln designs of commercial kiln manufacturers or kiln engineers. Mark M. Lehrbas, of the Southeastern Forest Experiment Station, gave a fine description of gas-fired kiln types in his paper, "Types of Gas-Fired Kilns in the South," delivered before the Texas Dry Kiln Club at Lufkin, Texas, January 23, 1948. He expanded this subject still further in a similar paper presented at the national meeting of the Forest Products Research Society in Grand Rapids, May 2, 1949.

Although individual gas-fired designs of commercial dry kilns contain some differences, their basic operation may be described substantially in six different types of kilns.

First is the natural circulation dry kiln, with manifold heat derived from a small gas furnace burner feeding into a manifold system located directly under lumber piles on kiln cars. The heat exchanger usually leads into a stack to vent the products of combustion to heat the air of the kiln. Where humidity control is provided, it usually appears in the form of water vapor produced by water sprays.

Humidity control is usually obtained by vent control during the drying process. The additional water vapor requires additional venting which means more heat lost. Direct-heated gas-fired kilns, therefore, are usually more wasteful of heat and the amount of humidity control at the end of the run is highly debatable. Indications are that it is somewhat deficient for precision kiln drying.

Manifolds may be thought of as a large header. In some gas-fired kilns the manifold is a large pipe in which the gas is burned and the vent is piped to a large heat exchanger. The manifold in forced-air circulation type kilns features an application where the gas is burned and pipe radiators are connected to the manifold and act as heat exchangers.

Second we shall consider the natural circulation kiln, with direct heating units taking heat from a series of gas Burners (usually of the urn type), which are shielded by a large metal hood extending directly under the lumber bunks for the full length of the kiln. As in the first kiln type, water sprays are used for humidity control, if any is provided.

Next is the forced circulation kiln, with manifold heat—obtains heat from underground furnaces located at both ends of the kiln, which open into a manifold system extending between kiln cars for the full length of the kiln.

The fourth type is the forced circulation kiln, with internal vented heat which procures heat from gas furnaces installed at each end of the kiln, opposite to each other and opening into a large combustion duct extending between kiln cars to the center of the

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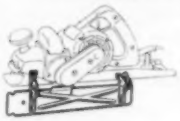

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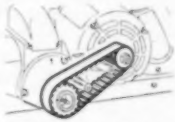

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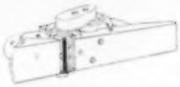

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kiln. The duct is vented with openings at the top to distribute heat into the kiln chamber. A system of vertical fans located between the lumber piles regulates circulation and air flow. The fans are reversible to permit changing direction of air flow at regular intervals. Humidity control is generally obtained in the form of moisture produced by burning gas, which has been estimated to approximate about six gallons per 1000 cubic feet of gas burned.

The forced circulation kiln, with blower-driven external furnace heat, derives heat from an external furnace and is usually equipped with automatic thermostatic temperature control. Heated air from the furnace is blower-driven into a large overhead duct extending the full length of the kiln between kiln cars and flows directly into the kiln chamber through a series of ducts and openings. Air flow and circulation are regulated by circulating fans and dampers. Provision is usually made to return some of the moist air from the kiln to a jacket over the furnace so that it may be reheated and forced back into the kiln.

Last is the forced circulation kiln, with blower-driven heat using either oil or gas as fuel. It is a single unit. Air is drawn from the kiln building by the blower, forced around a jacket over the burner and then mixes with the products of combustion and is delivered to the hot air distributing system in the kiln building, which usually creates circulation between lumber piles on kiln trucks.

In many of these gas-fired kilns steam has replaced the water sprays used for humidity control. Steam is supplied economically by means of a low-pressure steam boiler or a small steam-generating unit fired with gas. Inadequate humidity control has been a most troublesome problem with some kilns of the gas-fired type. Some kilns added practically no moisture to the kiln air in drying while others have operated water sprays continuously throughout the entire kiln run.

Courtesy Moore Dry Kiln Co., Jacksonville, Fla

Moore direct gas-heated circulation kiln in Arkansas has lumber packages loaded into kiln with lift truck.

It has been difficult to establish the exact date when the first commercial gas-fired kilns were developed. Reports available seem to indicate that the first installations may have been made in Texas and Arkansas sometime during 1945. Another kiln of this type was introduced to the trade in 1947 although its development had been carried on for some years prior to this date. Most of the early kiln installations reported were of the natural circulation kiln type, which incorporated manifold heating units located directly under the lumber piles and operated with heat supplied by a small gas furnace burner.

It was found soon after these kilns were put into operation that one of the major considerations was provision of proper precautions against fire. In recognition of the potential fire hazard, kiln manufacturers made heavy insulation, fire-proof construction and safety controls standard equipment. In some modern gas-fired kilns all ducts and

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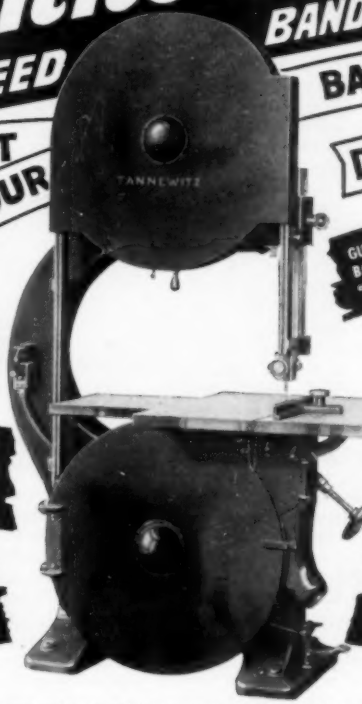

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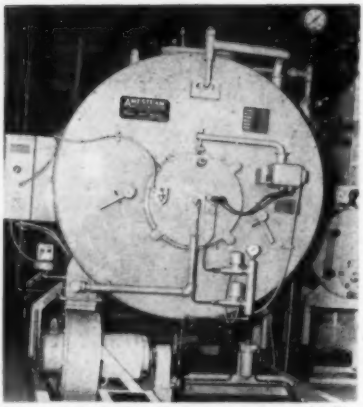
other combustion agencies are covered with as much as a 4" thickness of plastic insulation.

Some modern furnace-type kilns also provide equipment to permit automatic operation which incorporate automatic fire protection devices and controls. Heaters have also been designed and protected to minimize the fire hazard. A direct air heater (gas-fired) of the atmospheric pull-through type, for example, has gas burned and heat generated within a refractory combustion chamber. The heater body is made up of inner and outer heavy gauge sheet metal casing containing about 4" of insulating material.

A furnace-type kiln featuring automatic operation has a panel board carrying recording temperature controller, temperature limit controls and electronic flame safety control. Safety shut-off and temperature control valves are also provided to permit the equipment to operate automatically with only infrequent attention. The furnace controls are equipped to turn off the gas in case of power failure of fans or fire in the kiln or in the furnace blower system.

Notwithstanding the various precautions taken, where high temperature surfaces and organic material of low kindling type are present, there is bound to be some fire hazard. Investigation of reports of various kiln fires seemed to show that the direct-heated gas-fired kiln was more hazardous than either the indirect-heated kiln or the steam-heated kiln. One of the more common fire causes cited in these reports showed the primary sources to be trash collected on the manifold.

Special heat control is supplied in some kilns in which the gas furnace has two burners, a high and low burner. A temperature recorder and control unit determine which burner will be



Courtesy Moore Dry Kiln Co., Jacksonville, Fla.

Oil-fired Ames low pressure steam generator provides steam for heating Moore kiln at a Pennsylvania installation.

used. In an installation of this type it was reported that the kiln was kept within one degree of the desired temperature, other conditions being favorable.

Various direct-heated gas-fired kiln operations reported the use of low pressure gas in ranges of 4 to 8 ounces and 6 to 12 ounces. A kiln using a pressurized furnace fired by natural gas reported that flame under pressure of 15 lbs. p.s.i. burns at almost maximum efficiency. Pressure is supplied by a blower fan that also exhausts air from inside the kiln. Outside air is also taken in to provide sufficient oxygen for combustion.

Automatic valves control the amount of fuel which in turn controls temperature and serve to control the amount of air that is admitted to the combustion chamber. To bring kiln temperature up to desired drying temperatures quickly, a second set of valves is used which permit fast heating. When drying temperatures are reached, these auxiliary valves are automatically closed.

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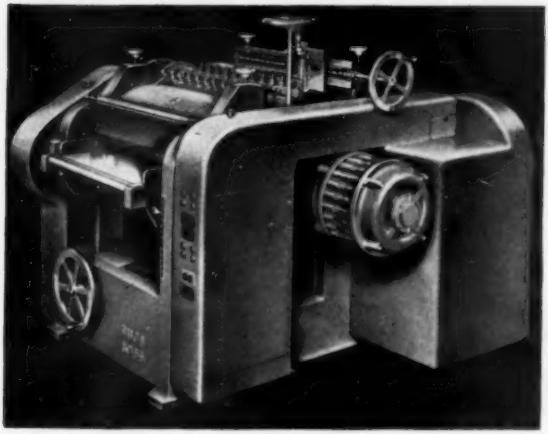

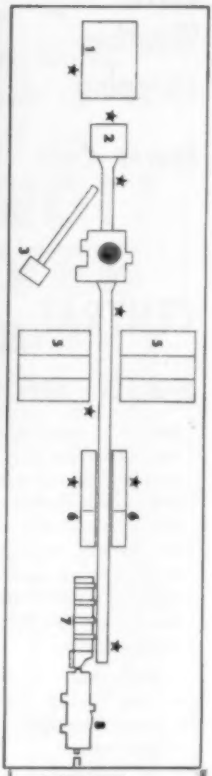

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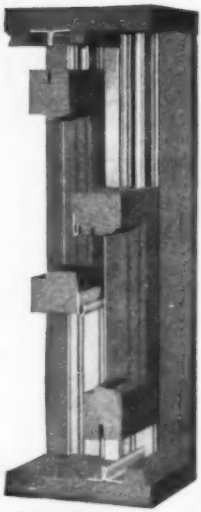

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A maximum temperature up to 250 degrees F. was reported but most kiln operators reported a dry bulb temperature range of 150 to 190 degrees F. for drying air-dried hardwoods and 180 to 200 degrees F. for pine.

A modern furnace-type kiln of the cross-piled, longitudinal, air flow, internal-fan type is operated with heating equipment consisting of a 1,500,000 Btu gas-fired industrial air heater. This is a compact unit and including blower measures only about 40″ high, 45″ long and 22″ wide. Natural gas, pre-mixed with air from a blower, is burned in the furnace. Hot air is carried by a duct from the heating chamber into the kiln to be picked up by the circulating air fans.

Average gas consumption of this kiln was reported to be about 2000 cu. ft. per thousand feet of lumber dried, with specific kiln lot requirements varying from 1000 cu. ft. for semi-dried softwoods to 4000 cu. ft. for redwood and pine. Fuel cost on a charge of 40c per 1000 cu. ft. of gas ranged from 40c to $1.60 per 1000 b.f.m. lumber dried to average less than 80c per thousand feet of lumber. Fuel cost for drying heavy ponderosa pine ranged from $1.00 to $1.25 per 1000 b.f.m.

General reports received showed cost of natural gas varying between 15c and 40c per thousand cubic feet. Volume requirements ranged from 1000 to 5000 cubic feet per 1000 b.f.m. of lumber dried. Fuel costs were found to differ with wood species, type of lumber product and thickness, differences between initial moisture content and final moisture content required, and type and design of dry kiln.

One report gave an operating fuel cost of less than $1.00 per 1000 b.f.m. in kiln drying air-dried hardwoods, with an initial moisture content of 25% to 30%, at a natural gas cost of 25c

per 1000 cubic feet. Other reports showed fuel costs ranging anywhere from 40c to $2.00 per 1000 b.f.m. of lumber dried, varying with initial and final moisture contents and other precision kiln drying requirements.

Furnace-type kilns have also been serviced in a number of later installations with artifical gas products. A kiln operation in this category reported obtaining very satisfactory results with the use of 40-60% propane-butane mixture for heating. Propane gas and butane gas have also been used as separate fuels in this application. Kiln operations using artifical gas products generally reported higher fuel costs than those using natural gas, some running as high as $5.00. Most of these operations, however, reported an average cost in a general range of about $2.00 per 1000 b.f.m. of lumber dried.

Gas-fired kiln drying time cycles varied considerably with final moisture content requirements, ranging from 4% to 18%; initial moisture content of lumber, from green down to 25%; hardwoods and softwoods; different thicknesses and species.

Performance records showed 4/4 green pine dried in a 72-hour cycle and 4/4 air-dried oak dried from an initial moisture content of 30% to a final moisture content of 4% in 96 hours; 8/4 air-dried oak was dried from an initial green condition down to 8% in 140 hours. Drying cycles ranged from a low of about 48 hours for air-dried stock to a high of about 96 hours for green lumber in 4/4 thickness in 96 hours for softwoods. Drying requirements in most instances were not too exacting. In precision drying, where uniformity was a critical factor in drying 4/4 hardwoods, sometimes involved a drying cycle of as much as 120 hours, even where initial moisture content was in the medium range.

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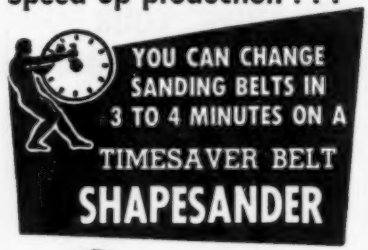

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indirect-heated gas-fired dry kilns now in operation in the United States could not be accurately determined. A report of five years ago showed that more than 400 dry kiln installations of furnace-type kilns, both gas- and oil-fired, had been made up to that time in just four southern states. A number of installations were also reported on the West Coast, principally in California.

As is true in the case of conventional dry kilns, the furnace-type dry kiln must conform in design and operation to basic accepted principles of modern kiln drying practice to produce the most satisfactory results. It is important that temperature and circulation be accurately and adequately controlled as well as humidity and air flow to effect the fastest uniform drying of lumber permitted by end-use requirements. Adequate facilities must be provided for this purpose.

Modern furnace-type kilns are available in various designs. They have an advantage of fuel efficiency and in their simplest form do not require heating coils, complex control equipment and other obstructions to handling of lumber. As direct firing eliminates most heating losses, fuel efficiency is relatively high and in limited areas natural gas costs are lower than other available commercial fuels. Quality of drying is generally fair to good and normal drying schedules of conventional kiln drying practice usually operate satisfactorily with little change.

Besides the relatively low cost of natural gas as a fuel, one of the chief advantages claimed for gas-fired kilns is their low operating cost. It is true that surprisingly accurate control has been possible in some of these kilns by combining normal kiln controls with gas furnaces and humidifying systems. It has been reported that when this type of kiln is equipped with adequate temperature and humidity controls, exces-

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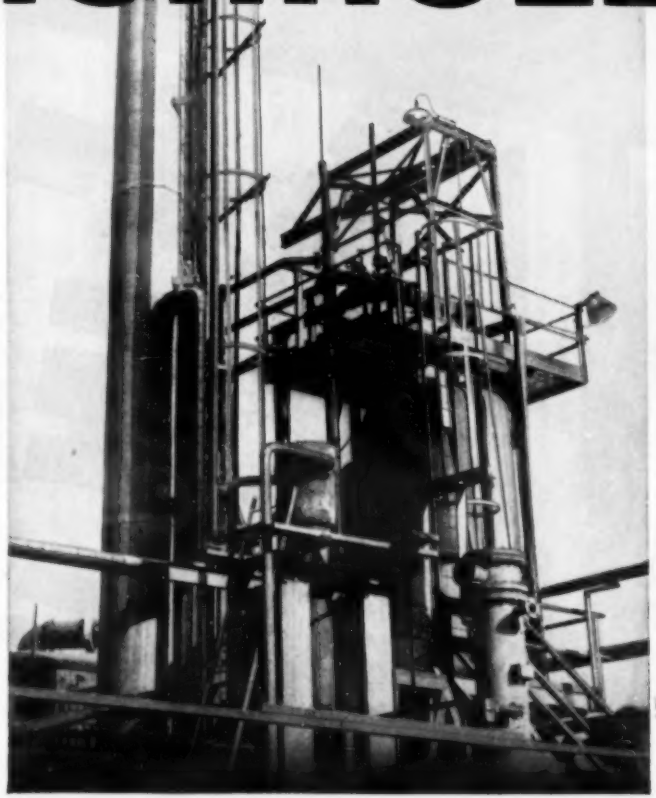

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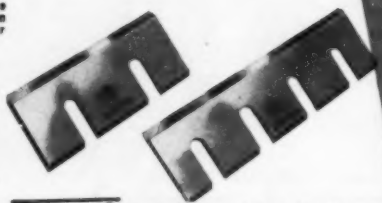

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It was an era of bigger screens. An era when, if Mr. Smith's neighbor bought a TV screen larger than his, Mr. Smith promptly traded his old set in for a larger one. And almost before he could place this new set in his living room, Mr. Smith's neighbor was trading his in for an even larger one.

In December, 1953, however, the boom ended. Not gradually, but with alarming swiftness.

As always, there were numerous reasons. Mr. Smith became perhaps a bit tired of keeping up with his neighbor (and besides, the set he had was performing satisfactorily). Moreover, it looked then as if color television might be "just around the corner." So Mr. Smith and millions of others decided to wait and see.

But color television was not immediately ready for mass marketing.

Cabinet manufacturers across the country began to re-examine their operations; to determine how to move the mounting inventories of conventional sets that, before, had steadily broken sales records.

Engineers and purchasing agents checked back on various materials that go into making the chassis and cabinet. One of these materials, for cabinet sides and tops, which they had turned down at C-R for two years, was double-checked. This was hardboard.

All available facts from hardboard manufacturers were convincing. But companies like C-R require more information. They have their own tests. Would hardboard, a dense, hard, 100% wood material, pass C-R's tests for laminating? Could it be surfaced satisfactorily? What about consumer reaction?

C-R, on a test basis, decided to find out for themselves. They began tests with both kinds of hardboard—the type that is smooth on both sides and the type that is smooth on one side and screen-textured on the other. They tested both the treated and untreated varieties; the ⅛" and the 3/16" thicknesses.

United States Gypsum Company's hardboard experts, long on experience in developing hardboard for pre-finished wall panels and other uses, were called in. C-R, working with U S G, found that Duron, smooth both sides hardboard, not only met all performance requirements, but came out with a cost factor almost unbelievable to them—as well as to their customers.

Caswell-Runyan plant, Huntington, Indiana, occupies 280,000 sq. ft. of floor space and uses almost every type of modern woodworking equipment.

By using hardboard for the tops, sides and backs (even fronts of some table models), C-R reduced the total cabinet costs to its customers as much as 40%!

Companies like Motorola (for whom Caswell-Runyan supplies cabinets), always on the lookout for cost savings if performance and quality are not sacrificed, put Duron hardboard to the test. They found it was durable and took a finish beautifully. Moreover, they found it had acceptance with the consumer, who has proven again and again with such things as nylon, wrought iron and glass cloth that he's interested in new uses of basic materials.

C-R, like other cabinet manufacturers, has found that with their new vertical graining machines (they have four) and with proper inks, they can obtain wood graining not easily recognized as anything other than real wood.

Hardboard, however, is an all-wood product. It is made of wood fibers that have been separated, then put back together under intense heat and pressure.

C-R has found these important advantages in hardboard which is smooth on both sides: (1) it takes the finish better because of harder surface; (2) both sides may be laminated to wood, hardboard, and other materials without sanding; (3) if one side is marred, the other can be used effectively, thus eliminating much waste; and (4)—highly significant—even the small amount of dust inherent in screen back board (which can't be tolerated in the wood-graining operation of cabinet production) is absent with Duron.

Motorola says it has cut down cabinet rejects to a marked degree since C-R switched to hardboard.

Hardboard has brought about many changes in the C-R operation, and significantly most of them have been profitable changes.

Where 120 men were once employed in the hand polishing room, now there are less than 30. That's because hardboard, after the wood-graining opera-

tion, doesn't need much rubbing. It has an exceptionally smooth finish to begin with. The entire hardboard finishing operation consists of the following:

First, a filler is applied to the surface, then a background color is added prior to painting on the wood grain (this is also called a "ground coat." A cream or buff color is used as a ground coat for a limed oak finish, for example. Two color tones of ink are used to get maximum limed oak coloring).

Adhesive is applied to wood stock which is then laminated to hardboard panels by inserting in jig.

After the wood grain is printed on hardboard, a sealer is applied, then a thin, hot sanding lacquer (30% to 32% solids) is sprayed on. The drying is done in large ovens, at about 130 degrees Fahrenheit.

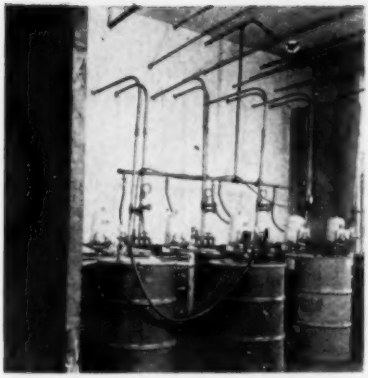
The labor-saving advantages achieved by using hardboard fit in well with C-R's thinking. For years this company has had the reputation of being one of the finest equipped plants in the country.

C-R's plant, the largest in Huntington, is split into two factory buildings connected by an overhead ramp and a

After wood stock is laminated to hardboard, the assemblies are clamped; held under pressure until adhesive is dry. Note each stack is on casters for easy movement.

separate office building. It occupies 280,000 square feet of floor space aside from a large lumber yard and rented storage space. Housed within are machines and equipment of almost every type in use today to cut time and labor costs. These include two American

When cabinet units are assembled, a filler coat is applied to surface.



Finishing materials for every part of the huge Caswell-Runyan plant go out under pressure from this room. Using Alemite Versatol pressure pumps with lines leading out in this manner minimizes chances of fire.

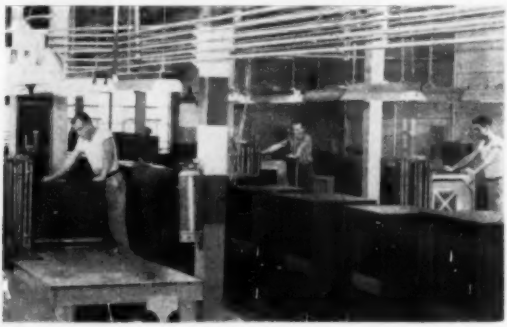
single-head planes, a Diehl chain-speed jointer, six Mattison and Diehl rip saws, Billstrom glue carrier, Mattison and Vonnegut molders, three tenoning machines (Greenlee, Jenkins and Challoner), a Smith 3-drum sander, six Tannewitz trim saws, and many others.

Machines like these have helped Caswell-Runyan in its fight for lower cabinet costs. And C-R has been aggressive with many of its own ideas, such as an ingenious ramp between the first and second floors which saves hundreds of man-hours of labor a year, and a new way of detecting defects in its surfacing operations.

The latter idea, C-R believes, is an "original" for their company. It came from a "glue spot" problem. They found that once a spot of glue is left under the lacquer finish, it dulls the cabinet surface permanently. The problem was how to detect a small spot of glue, before lacquering the area. They tried several techniques, including flashlight inspections. They even tried fluorescent powder. Nothing worked. Then they found that ordinary cake coloring, mixed in with the glue, gives it a color you can spot yards away—if it's on the surface where it shouldn't be.

Between C-R's own ingenious ideas, some of the world's best machinery and hardboard, it has now boosted its daily television cabinet production well above the 1,500 mark. And C-R executives, including A. H. Schenkel, president; Fred W. Tower, vice-president & sales manager; A. J. Glass, works manager; Frank L. Pyle, vice-president & manager of the Electronics Division, and Howard Stewart, purchasing agent, are optimistic about the future.

"Color television will mean an even brighter future for hardboard," Howard Stewart predicts. "For it has already



Hardboard is well adapted to wood graining, done in the Caswell-Runyan plant with modern vertical units like those shown here.

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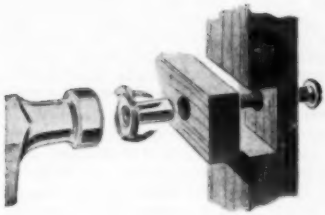

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Outgoing television cabinets from Caswell-Runyan leave the packaging department on the second floor, and shoot down to a loading ramp one floor below on this simple ramp system developed by a C-R employee.

proved itself in black and white television cabinet production—and color television sets will need the cost advantage."

Caswell-Runyan, which has made cabinets for practically every major television manufacturer, ought to know. And, in the bright future of color television, they will—without a doubt—play a major role.

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Ted Starr, Acme Idea Man in Columbus, Ohio, helped solve this high-speed bundling problem.

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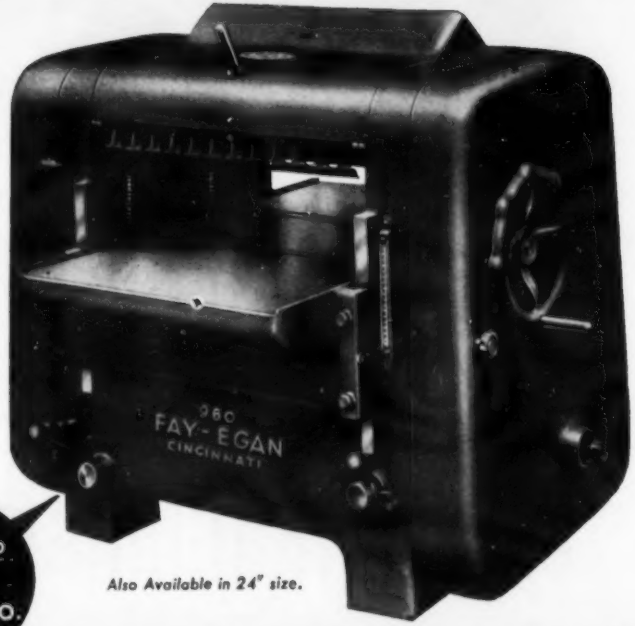

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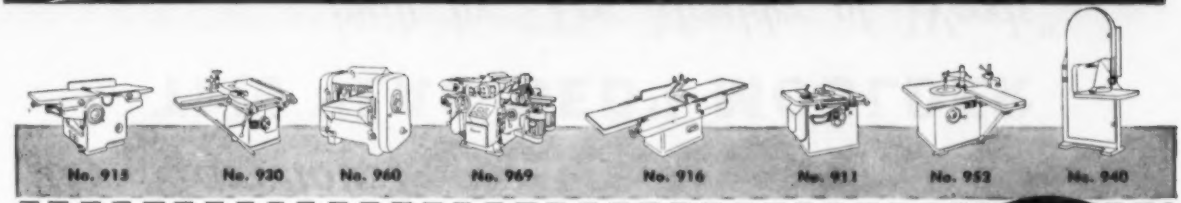

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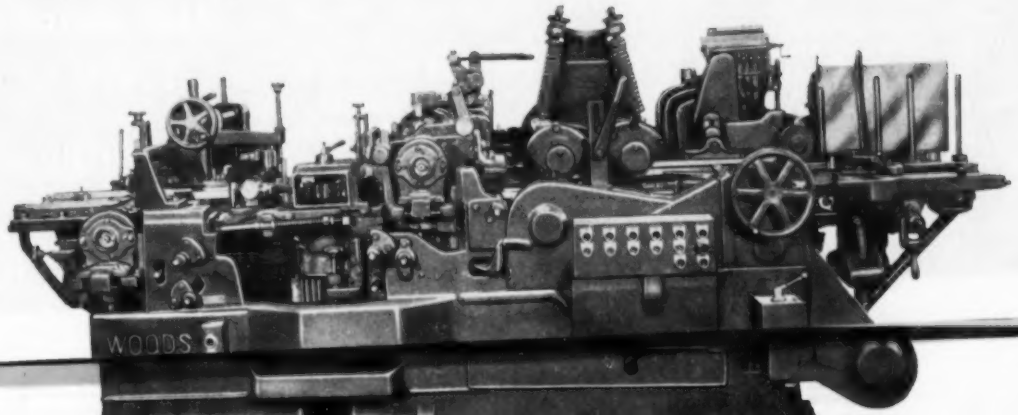

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Wood Working Panel

By RUSSELL C. DECKERT

WOOD Working Panel, a service for readers of Wood Working Digest, is conducted by Russell C. Deckert, industry service representative, at the State University of New York College of Forestry at Syracuse.

The purpose of this feature is to answer readers' questions regarding the use of wood in wood industry. It is hoped that other industries with similar problems will benefit by reading the questions and answers.

1. We have been asked to submit quotations on handles turned from basswood and yellow poplar (samples sent under separate cover appeared to be file handles). We would appreciate your comments regarding the turning characteristics, machine set-up, and proper moisture content for basswood and yellow poplar.

(J. H. P., N.Y.)

My immediate reaction would be to discredit the use of basswood and yellow poplar as handle stock. However, I submitted your problem for analysis to our wood utilization research staff here in the College of Forestry, and Robert J. Hoyle, research assistant, has the following comments to make:

"We hesitate to recommend either basswood or yellow poplar for your purpose. They are not considered good handle woods, because they do not wear smooth with use in the hand and are difficult to turn with good quality unless thoroughly seasoned.

"The woods most commonly used for handles in the Northeast are hard maple, beech and birch. White birch is a particularly good turning wood. Yellow poplar and basswood are seldom used for tool handles. If you could persuade the customer to accept beech, birch or maple, we believe he would be more satisfied with the product and you would have less trouble with machining.

"The influence of moisture content on the quality of wood turnings depends upon the species and does not seem to be associated with density or growth rate.

"Turnings made from 20% moisture content wood are generally inferior to those made from wood at 12% or less. There doesn't seem to be much variation in quality at various moisture contents below 12% although no tests have been made at moisture contents below 6%.

"Thoroughly air-dried or kiln-dried wood in which the moisture content has been reduced to 12% or less shou'd make good turning stock. Some species, such as beech, turn well at higher moisture contents. Yellow poplar turns very well at 12% and poorly at 20%. Basswood turns fairly well at 12% but very poorly at 20%. The recommended species turn as well or better at 12% and are

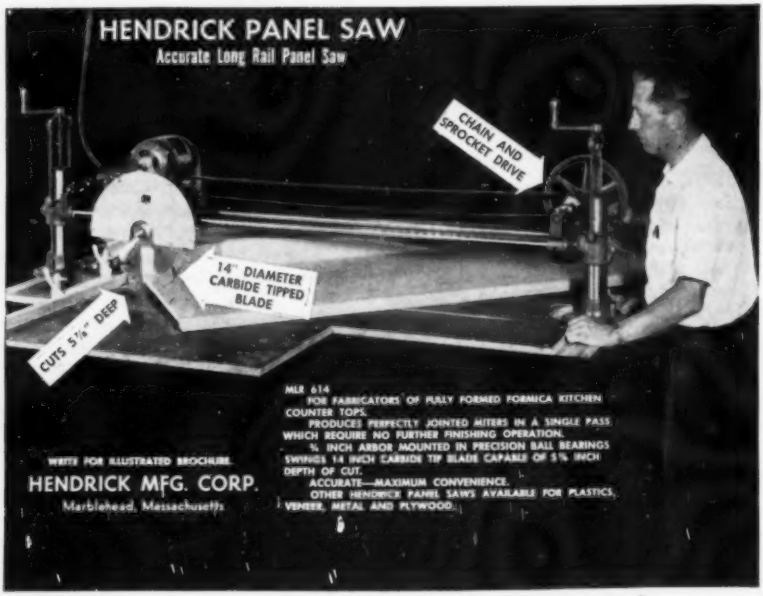
Questions should be sent directly to WOOD WORKING DIGEST, 222 East Willow Ave., Wheaton, Illinois.

superior at 20% moisture content to either yellow poplar or basswood.

"The following figures are taken from Tables 7 and 8 of U.S.D.A. Tech. Bull. No. 824, May 1942, by E. M. Davis, Senior Wood Technologist, U.S. Forest Products Laboratory, Madison, Wisconsin:

Kind of Wood	Percentage of Turnings of Good or Excellent quality at Moisture Contents of:			
	6%	12%	20%	Av. of 6, 12, and 20%
Beech	99	92	78	90
Hard Maple	95	87	63	82
Yellow Poplar	98	98	49	81
Birch	93	82	62	80
Basswood	88	76	35	68

"Basswood, as you can see, is one of the poorer woods for turning. At 20% moisture content the quality deteriorates to 35% acceptable pieces. In the case of yellow poplar, a good turning wood at 6 to 12%, the quality decreases to 49% acceptable pieces at 20% moisture content. These woods, like most other species, should be machined at moisture contents of 12% or less.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"We do not know the type of machine you are using to make handles but assume it is a back-knife lathe. It has been found that high turning speeds produce better quality work than low ones. The speed to be used depends upon the diameter of the turning. A report by the Vermont Bureau of Industrial Research on a survey of the wood turning industry in that state indicates that peripheral speeds, based on the minimum diameter of the handle in question, of 1000 to 1500 f.p.m. are used on lathes making products such as handles from beech, birch and maple. It appears that higher speeds within the limits of machine construction would give improved results. Depths of cut vary from ⅛" down. Most wood turners prefer a maximum depth of cut of 1/16".

"You probably have worked out the proper knife angles for your machine. We find that quite a variety of included angles are used, depending on species and tool material. A cutting angle of 0° seems to be most widely used. It is often possible to improve quality by changing the cutting angles."

2. For the past few months we have encountered a yellow or golden discoloration in our yellow birch veneer. Information as to cause and remedy for this discoloration will be greatly appreciated.

(S. P.,Vt.)

This discoloration is chemical in origin and takes place in the wood cell. It is a chemical stain and occurs primarily in yellow birch.

Dr. Robert A. Zabel, wood pathologist here in the College of Forestry, reports that a microscopic study of the infected wood shows reddish resin-like deposits in the walls of the wood vessels and rays. This condition is common in the sapwood and is particularly heavy in the area close to the heartwood.

The stain appears in the wood within an hour after the veneer is cut. There-

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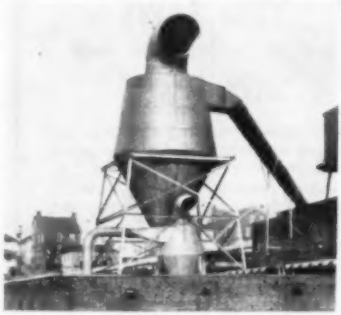

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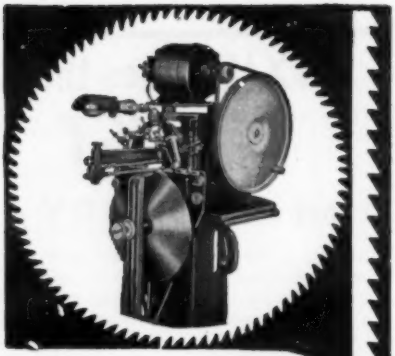

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fore, if the freshly cut veneer is immersed in water or dried immediately after it is cut, staining will be eliminated.

At some veneer plants it is rather difficult to employ the above preventive measures. However, I know of a veneer company in New York that has succeeded in eliminating this chemical stain by prolonging the conditioning period for the veneer logs. They steam the logs for 12 hours and then put the logs in holding vats for 24 hours at 150°F.

3. Will you please give us information regarding the relationship between DC electrical resistance and the moisture content of lumber, and the methods by which standards are determined?
(W. F., Mass.)

I am enclosing a New York State College of Forestry publication, "A Review of Electrical Properties of Wood," by John M. Yavorsky, which will give you the necessary information.

Professor Yavorsky has the following comments to make: "The relationship between DC resistance and moisture content was first established by M. Hasselblatt. In this country, A. J. Stamm did the pioneering work and today there are several commercial models of moisture detectors which employ the DC resistance of wood to measure its moisture content. The Delmhorst moisture detector, manufactured by the Delmhorst Instrument Co., Boonton, N.J., is an outstanding example of this type.

"The electrical properties of wood at radio frequencies have also been used to determine its moisture content, and the Moisture Register, made by the Moisture Register Co., Alhambra, Calif., is a unit employing these principles.

"All of the moisture detectors available commercially are standarized in terms of the DC resistance of Douglas fir. The resistance values for this species, as well as many other woods, are given over a wide range of moisture content

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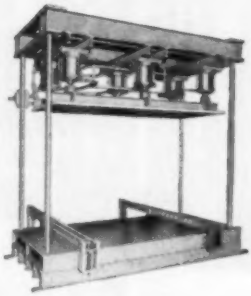

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USERS SAY UNION CUTS COSTS—SPEEDS PRODUCTION

in the U. S. Forest Products Laboratory Report No. R1660, available from the Laboratory at Madison, Wisconsin."

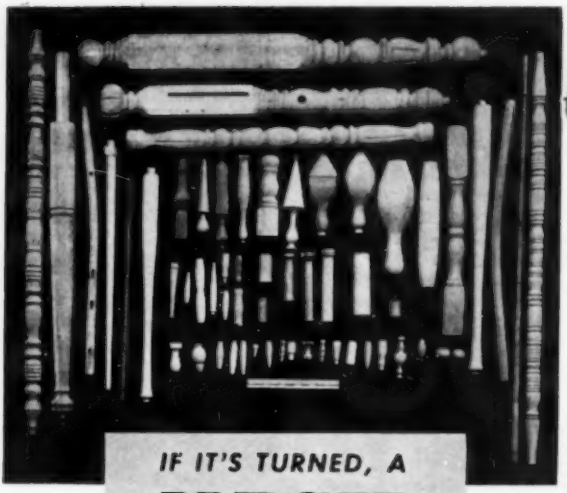
4. Under separate cover we are sending samples of a wood called cativo. We were told that this wood is odorless but the samples received tend to disprove this statement.

(J. A., N.Y.)

The wood is Porioria Copaifera gris, which on the U. S. markets is known as cativo, floresa and tabasara. The tree is native to Panama, Columbia, Jamaica, Nicaragua and Costa Rica.

Cativo compares favorably with yellow poplar in most mechanical properties. The wood is easy to work, but sometimes shows a slight tendency towards fuzziness. In the U. S. Forest Products Laboratory Report No. R1744 the wood is rated as good in planing, shaping and turning; fair in boring and poor in mortising and sanding.

The wood contains a large amount of gum and sometimes this presents a problem in its use. When green, the wood has a fragrant odor, but after seasoning the odor is not distinctive. It has been used as core stock for furniture panels, millwork and veneer and plywood.



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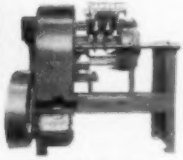

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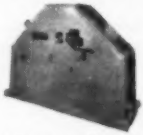

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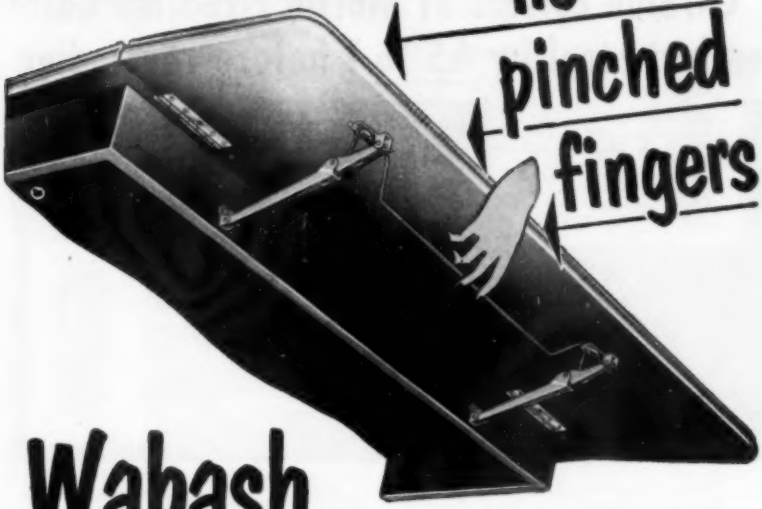

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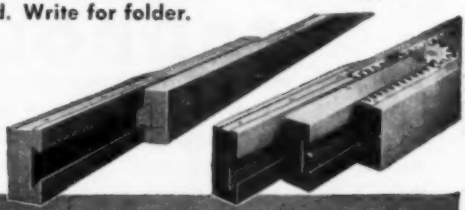

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Molding and Irregular Shaping

Here are some "saw tips" given to us by DeWalt Inc., Lancaster, Pa. Three-dimensional flexibility is built into the DeWalt radial arm woodworking machine. Figure 1 shows molding being cut with the motor of the variety saw in vertical position—the cutting tool is horizontal. Instead of lying flat on the table top, however, the material is held in an upright position.

In order to complete a molding cut safely and efficiently, the material to be processed must be firmly "backed" by a much higher guide fence than the one normally used. Figure 2 shows the construction of an easily made jig to replace the standard guide fence and rear table boards when the machine is to be used for this operation. The jig is clamped into place by tightening the thumb screws at the rear of the table in the usual manner. Note that a square hole has been cut into the horizontal board to allow the motor shaft and arbor nut to project down through the surface of the table.

Figure 3 shows the action of the molding head extending through the high guide fence and completing the decorative shape on the face of the stock. In this case, a "hole-in" board has been

Figure 1.

bolted to the wood table top for more accurate and efficient operation. Like the high guide, this hold-in device is quickly and easily made from lumber you will have on hand. In addition to the board itself (slotted to allow for varying widths of stock), you need only two carriage bolts to hold it firmly to the wood table top.

Irregular shaping is illustrated in Figure 4. To set up for irregular shap-

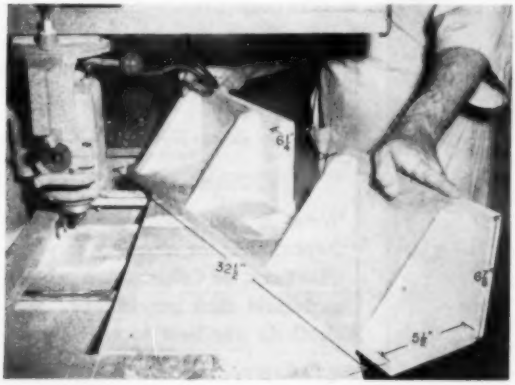

Figure 2.

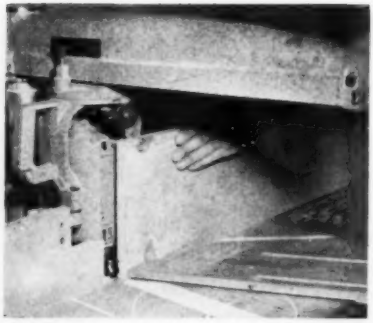

Figure 3.

ing, the motor is dropped to vertical position (cutting tool horizontal) as for straight line shaping or the molding operation previously described. In order to allow the shaping head to follow irregular curves, however, the standard guide fence must be removed from the table top. Then, to maintain the stock in proper relation to the cutting knives, a circular guide ring of the same diameter as the cutting circle of the head must be provided. Although DeWalt offers an accessory consisting of a steel shaper ring of this type, you

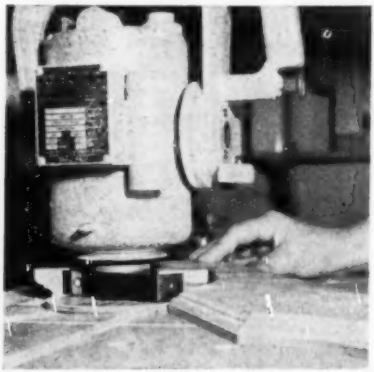

Figure 4.

may find it more convenient and less expensive to make a variety of these rings for your own use.

The last figure shows the simple construction of the irregular shaping ring. To determine the diameter, measure the shortest distance between the cutting surfaces of the opposing shaper knives. This will insure that the stock will enter the knives to the exact, uniform extent. The inner circle of wood is removed from the ring to allow the motor shaft to project below the surface. The shaper ring is then nailed to a small piece of 1" scrap lumber which replaces the standard guide when the machine is to be used for this operation.

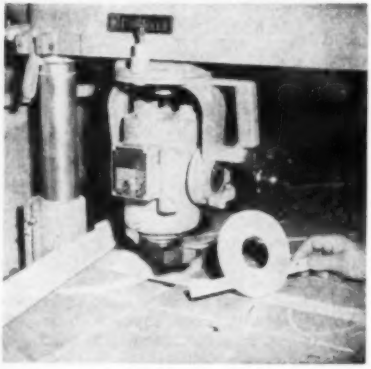

Figure 5.

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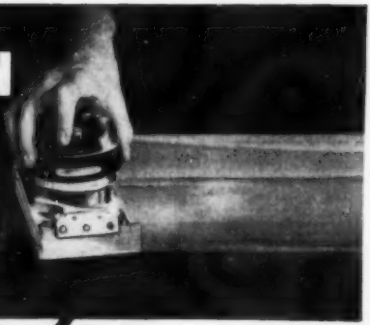

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SECTION

SYNTHETIC FINISHES and THEIR APPLICATION

By H. H. Connelly

A SYNTHETIC finish is an offspring of the laboratory and consists of synthetic resins such as urea formaldehyde, phenolics, alkyd, vinyl, and malic anhydride.

On the other hand, the old time varnishes consist of natural gums such as kauri, amber, copal dissolved in linseed, soya, tung or dehydrated castor oil. Where varnish, as the term usually implies, dries slowly, the synthetic finishes have rapid drying properties like lacquer. This leaves the film comparatively tack free in a few minutes.

What elements are to be considered when going to synthetic finishes? First, you will need a system for heat curing. A conveyor is an advantage as well as an economy but not a necessity.

Second, what spray guns are necessary? The same you are now using. Most concerns find spray tips and nozzles that give a satisfactory spray pattern for regular varnish or lacquer will do the same job for synthetics. You ask about stains, fillers, sealers?

Here is a finishing schedule common to many furniture plants for finishing high grade mahogany with synthetics.

1. Prepare the wood in the white
2. Dust
3. Size
4. Stain
5. Wash coat
6. Sand
7. Fill
8. Seal
9. Sand
10. Tack rag
11. Finish coat
12. Cure
13. Top coat
14. Rub
15. Wax

If you are finishing oak, the problem will be somewhat varied. For close grained wood such as maple or birch, another route will logically follow.

Regardless of the type of wood you are planning to finish with synthetics, set up a system for controlling the quality of material entering the finishing room from the assembly department. This is important.

How much work are you doing in the finishing room to correct the other man's mistakes? Unnecessary filling because of poor sanding? Patching because of loose veneer that should have

been corrected in the white? Filling dents with stick shellac because the dents were not raised with a hot iron and water in the cabinet room?

One method to catch these mistakes before they enter the finishing process, is to give each item an impartial inspection by an inspector under the finish room supervision—a man who knows what a scratch across the grain will look like when stained.

All white wood should be sanded carefully with a fine grit paper just prior to finishing. A 5/0 garnet paper, plus a felt block and steel wool for turnings and carvings will do an excellent job.

Look for glue stains and spots from the assembly jigs. Glue on white wood is about as hard to find as a needle in the proverbial haystack.

The Size Coat

With synthetics, a careful preparation of the wood is just as important as with lacquer or varnish.

Sizing the wood, however, with a 10% coat of glue is not as important where nongrain raising stain is used as when a water or spirit stain is applied.

The purpose of glue size is to raise the loose fibers that would normally swell when dampened with water stain, thereby causing trouble when the filling and sanding is later performed.

You can make your glue size by adding one pound of liquid animal glue to nine pounds of lukewarm water.

The application can be performed by either brush or spray gun. If a gun is available, the sizing can be performed on the conveyor with a drying period following.

Normally, a feed tank pressure of ten pounds per square inch is sufficient to force the necessary quantity of material to the gun. A gun pressure of 40 pounds is ample for atomization.

Sanding with the grain can follow immediately after drying. If force drying is used, baking the wood through a temperature of 150°F. for 30 minutes. On woods that are not porous, less drying time is needed.

What Stains For Synthetics?

Your stain for synthetics need be no different from that you are now using. On the other hand, there is room for improvement if you are now using water or oil stain, and a thorough investigation may lead to a saving.

For many years furniture makers turned to chemical stains for coloring their work. One of these was permanganate of potash and still used today by concerns making authentic reproductions. It is made by adding six ounces of powdered permanganate of potash to one gallon of hot water, and will produce most all shades of brown by diluting or adding more chemical to the water when mixed.

Another familiar old recipe was that of adding four ounces of bichromate of potash to a gallon of water and wiping over the surface to reach a shade of brown.

Sulphate of iron will produce black and gray; nitric acid, sulphuric acid and picric acid were a long time the source of yellow shades on woods and undoubtedly removed the hide of the operator in many cases.

This type of stain is not too satisfactory because of the chemical change, part through burning, that imparted the color to wood. What the furniture finisher wanted was a dye, opaque and stable to light.

Stains made from aniline dyes are generally divided into solvent classes: (1) water aniline, (2) spirit aniline, (3)

oil aniline, depending upon their solvents and (4) non-grain raising stains made from water soluble acid aniline dyes dissolved in alcohols and heavy carbon chemicals.

All of the above stains can be secured in the dry powder and mixed to a prescribed formula leaving only the job of adding solvents in the plant. In the earlier days the former method was almost entirely adhered to, consequently a profusion of colors flowed from the factory; few finishing factories had the laboratory control facilities for exact duplication.

You will find that in recent years the practice has entirely changed. Now we find with open stock lines, the necessity of consistently reproducing the same color, requires exact methods.

Wash Coat, Sand and Fill

This is your next step in finishing with synthetics. A wash coat is not necessary in the sense that a poor finish results if left off. A good finish can be secured without a wash coat. And what may come as a surprise to many—a wash coat can save you money in labor.

The reason is not difficult to understand. Wash coating provides a smooth base upon which the filler can be spread through a mild sealing effect. Whiskers and porous wood are corrected. When wiped across the grain less force is required to clean up the work satisfactorily. A surprisingly clean uniform color is imparted to the wood when a dye is incorporated with the filler.

A light sanding should follow wash coating. Most finishing men feel a 7/0 paper—even 8/0—is best. A coarse grit will penetrate the stain and leave a contrasting color.

For moldings, 000 steel wool is recommended. Steel wooling as well as sanding should be in the direction of the grain.

Your filler for synthetics may vary, depending upon how sensitive the solvents in the filler are to the solvents in the synthetics.

If not compatible, you will note a puffing of the grain when the synthetics are first applied. This may result in later shrinkage which has an equally bad effect upon the final finish. If such a problem arises, consult your finishing supply house for advice. In most cases, the problem is easily remedied by adjusting the solvents in either the filler or the synthetics.

You can apply filler by brush or spray gun. If a spray gun is used, secure the air cap and nozzle suitable for spraying filler.

Filler contains silex, an ingredient noted for its abrasive action. After prolonged use the air cap will be worn to the point where it is not effective and consequently wastes more material than necessary.

A tank pressure of 15 lbs. is best for forcing the fluid to the gun. An atomizing air pressure of 45 to 50 pounds per square inch is adequate for

"Your husband taught us not to let blondes walk through the machine shop."

the gun. One thing in the operator's favor when spraying filler—no worry of sags and runs.

Synthetic Sealers

A low solids sealer with a sanding air incorporated is recommended as a suitable wood sealer for synthetics. Lacquer sealer is quite satisfactory.

A sealer should be applied with spray gun and a film thickness of one mil is of the most satisfactory thickness.

A thinner film is too easily sanded through and will not provide the smooth base necessary for a quality top coat.

For best results use a gun pressure of 40 to 50 pounds per square inch at the gun tip. Heavier pressure wastes material.

If you are using a pressure feed tank, try a tank pressure of 15 lbs. per square inch.

Again it is wise to point out that the pressure your gauge reads is not always the pressure at the gun. The longer the hose, the greater the pressure drop. Likewise the smaller the inside diameter the greater the pressure drop.

Allow the sealer to dry from one to two hours before sanding. Shrinkage of the film will not have completed to the point where sanding is final if done too green.

A fine sandpaper, 6/0 or 7/0 provides fast clear cutting and leaves no scratch mark. Again sand always with the grain.

Application of Synthetics

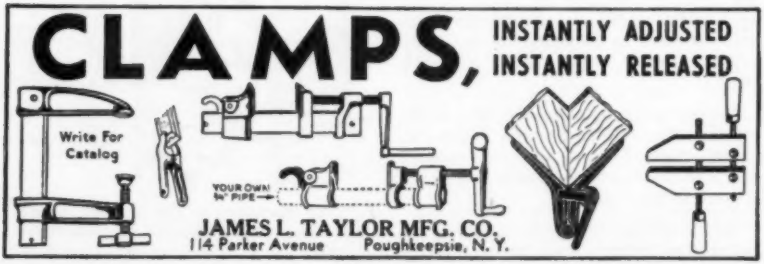
Such finishes are principally composed of alkyd and urea formaldehyde resins. They consist of from 40% to 50% solids. They come ready to spray and heat is not necessary for curing but an asset. Note the following curing schedule at various temperatures.

Temperature—Degrees Fahrenheit	Curing Time
150°	45 minutes
140°	60 minutes
130°	1½ hours
120°	2 hours
110°	3 hours
100°	8 hours
90°	16 hours
75°	24 hours

One pertinent advantage of synthetic over lacquer is found in the high percentage of solid content.

Where you are now spraying two coats of 27% solids lacquer to obtain a film thickness of 2.0 mils, you will be able to obtain a film of equal or greater thickness with one pass of synthetic.

This has a distinct advantage in labor costs. Where you are now using two sprayers to coat a piece of furniture with lacquer you can get equally satisfactory results with one sprayer.



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In low bake synthetics we find the same superior advantages over lacquer in toughness, scratch resistance and general durability. It is likewise just as resistant to alcohol as oven bake.

A uniformly sustained air pressure is important in spraying synthetic finish. You will find better atomization results when spraying with 60 pounds air pressure per square inch at the gun.

A trial will soon show whether this is satisfactory for several factors influence proper atomization. For one the temperature of the fluid should be maintained at room temperature. Cold synthetic will have a heavier viscosity than a bath several degrees higher in temperature.

Another factor that will influence correct spraying is age of synthetics. Synthetics will thicken and the viscosity be increased if the solvents have been allowed to escape to any appreciable extent.

There are several precautions you should take when baking synthetics. For one, during the baking process maintain a relative humidity in the oven of about 30%. This is a safe percentage to maintain to minimize damage to the furniture through moisture change.

Obviously a high humidity will cause the wood to take on moisture. Results—swelling followed by strain where the wood dries out and shrinks.

If on the other hand the ovens are run at a temperature of 150°F. without the 30% humidity, you will find the wood drying out to a dangerous level of moisture content.

Following the spraying, the furniture should have a flash period of 30

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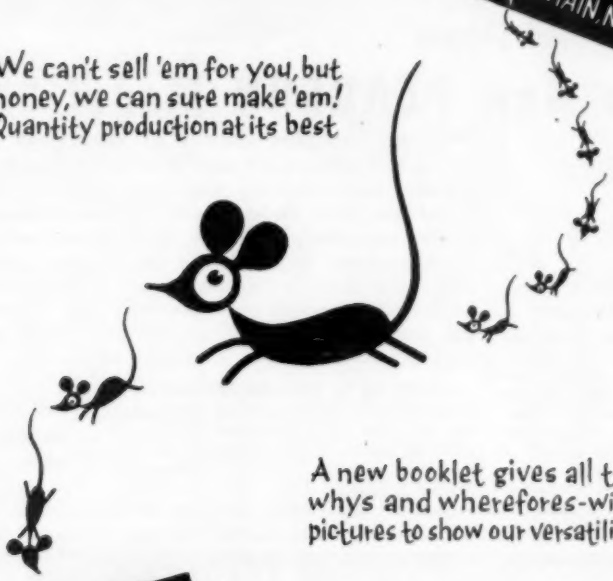

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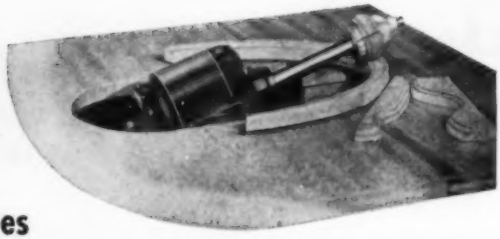

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minutes before going into the ovens. You will find this important for two reasons. This short period allows the solvents to evaporate and permits the film to set up tack-free, lessening the chances of blistering in the baking operation. This short time allows the film to dry so it will not pick up dirt or dust in the ovens, too.

Following the baking, all stock should be allowed to air cool to room temperature. In most plants this period will be from thirty minutes to one hour, depending upon the movement of air in the finishing room.

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If two coats are necessary, the first coat should be baked to a finish, then the second coat applied.

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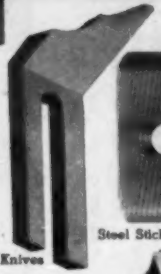
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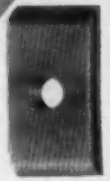
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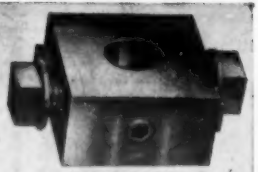
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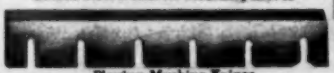
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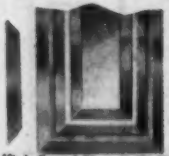
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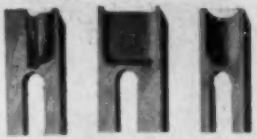
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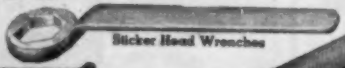
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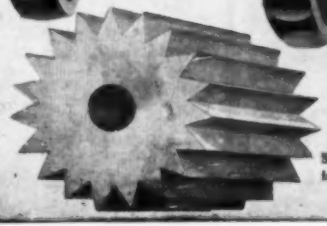
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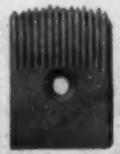
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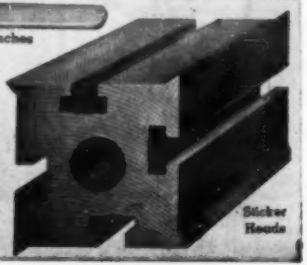
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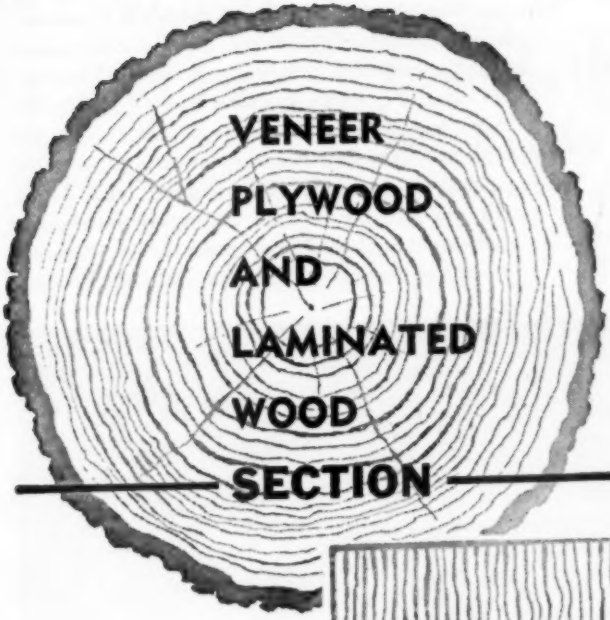

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PLYWOOD *Is Better . . .* Dimensional Stability

By **Thomas D. Perry**

Dimensional stability under service conditions is a rare quality in any structural material.

Most metals expand and contract under heat and cold. Expansion joints are required in concrete, to prevent cracks due to aging and heat. Most plastics act queerly on aging and their distortions are hard to predict. Wood and wood composites expand and contract during wetting and drying. If there are exceptions to this general rule they are few and far between!

Designs for every fabricated product, from a small wooden cabinet to a skyscraper, or to a mammouth viaduct, must be modified to provide for such dimensional instability under normal service conditions.

PLYWOOD is a composite wood material, made of thin layers of veneer, having the grain of each adjacent layer, usually at right angles to its neighbor, and glued into a solid whole. It is often called "improved" wood, since human ingenuity has developed a variety of techniques that overcome many of the limitations that are inherent in solid wood.

Plywood is, obviously, more costly than solid wood, based on cubic content, due to the addition of material and labor. Often this cost differential is offset, on the one hand, because less plywood will serve as well as more lumber, and on the other hand, because some of the limitations of solid wood have been overcome, and its usefulness has been distinctly broadened.

Characteristics of Wood

Wood is a fibrous growth, the structural framework of which consists of a multitude of elongated and more or less hollow cells, arranged in a substantially parallel direction, with overlapping ends. In the growing tree these cells are partly filled with sap, which is largely water. When the log is converted into lumber or veneer and dried, most of this sap is evaporated. During this evaporation process, below 30% moisture content (called the saturation point and referring to the cell walls rather than to the major cell cavities) there is a distinct shrinkage. This shrinkage is in the diameter of the cell, and not in its length, where the shrinkage is negligible. Hence a board or sheet of veneer, as its shrinks, becomes narrower and thinner, but not shorter along the grain.

The average shrinkage, covering many species and several types of cutting, is of the order of 1% in dimension to each 5% reduction in moisture content. Little shrinkage occurs above 30% M.C., and the practical range is between 30% and 5%, which is the minimum for most wood used in manufacturing. This means that the removal of 25% of moisture is accompanied by about 5% loss in dimension, in width and in thickness.

While this discussion refers to wood shrinkage during drying, from 30% to 5% M.C., the same phenomenon, in reverse, occurs when wood swelling takes place as moisture is absorbed by the

wood cells, and increases from 5% to 30% M.C. The cellular structure of the wood takes on and gives off moisture rather easily, and any appreciable change in moisture content affects its dimensional stability.

While most service exposures fall far short of this total range, between 30% and 5% M.C., it is the maximum for which provision must be made in the designs. Those who use solid wood, either from necessity or from choice, must face, and so far as possible, solve this shrinkage problem.

Plywood is Dimensionally Stable

Plywood construction employs the endwise stability of one veneer layer to restrain the widthwise instability of the adjacent layers by gluing them together. This is illustrated by Fig. 1, in which the solid black bars are parallel to the wood grain in each layer, and are

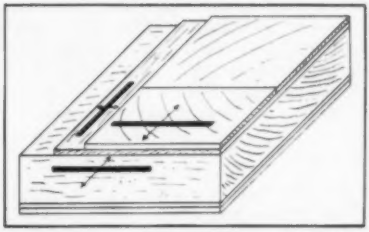

Fig. 1. Restraining shrinking and swelling in adjacent layers of plywood.

dimensionally stable. The small arrows, perpendicular to these bars, indicate the tendency to expand and contract across the grain of the wood, under the influence of moisture. This is the fundamental principle involved in converting dimensionally unstable wood into dimensionally stable plywood.

While this restraint on adjacent layers, which are united by a glue joint, is the basic principle, there are several other factors that must be considered to make plywood dimensionally stable. The power, or force exerted, when wood contracts or expands, widthwise, is substantial. The glue must provide a grip greater than this power, in order that the glue joint will remain firm during these moisture changes, even to the maximum extent indicated above. This power in wood varies with the density, the species, the thickness and the direction of the grain. The magnitude of the changes in width in these layers, if unrestrained, is surprising. The maximum dimensional change of 5%, while only 1/6″ in 3″, in 20″ becomes one full inch.

Examples of Dimensional Stability in Plywood

Perhaps these facts can best be illustrated by a few examples, which are shown in Fig. 2. These samples were made to meet maximum conditions, and are far above the average in the severity of the service conditions imposed. All samples were one inch long, in the direction of the grain of the face veneer, and 12″ wide across its grain. All were of 5-ply construction, cross layered, and each with layers of different thicknesses. All were glued in hot presses with a phenolic resin adhesive to insure a glue joint that would withstand prolonged soaking in water. The tests were devised to demonstrate the character of the expansion or swelling of the wood in each layer, rather than to test the strength and durability of the glue joint.

The upper sample, A, was made of 1/16″ veneer, total thickness 5/16″. After prolonged soaking to the point of saturation, all joints were found to be tight and strong. Some minor swelling was detected by rubbing the fingers along the extreme edges.

In the case of the second sample, B, which was made with all layers of 1/8″ veneer, the total thickness was 5/8″. Since these veneers were twice as thick as those in A, the power to expand was

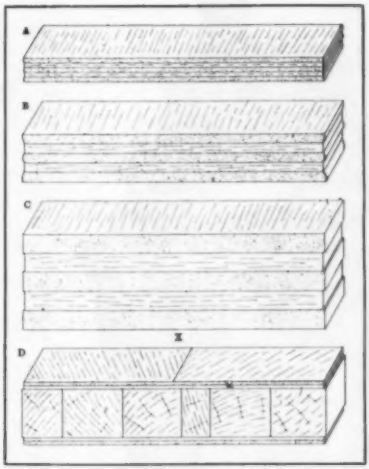

Fig. 2. Effect of layer thickness in plywood constructions.

doubled, putting a much more severe stress on the glue joint. The examination after prolonged soaking was not quite as satisfactory as in A. The edge swellings were more noticeable, but the joints gave satisfactory strength tests. The results appeared to be distinctly marginal.

The third sample, C, was made of veneers ¼" thick with a total thickness of 1¼". Here the expansive force of the wood was fourfold that of sample A. The strain on the glue joint was greater than it could withstand, and after prolonged soaking there was appreciable delamination at the extreme edges. Instead of swelling at the edges, the alternate layers definitely protruded, somewhat irregularly. It was quite evident that this quadruple power of expansion, as compared with 1/16" veneer in sample A, was greater than the shear strength of the wood. The inevitable conclusion was that the use of ¼" veneer in any or all layers, did not produce satisfactory plywood that was dimensionally stable.

The fourth test, D, was that of a lumber core construction, such as is customarily used in tops, doors and other parts of cabinets, furniture, interior trim and the like. Obviously it was not suited to withstand such severe exposure as prolonged soaking. The result could have been predicted from tests A, B and C. The joint between the veneer face and crossing was sound, but the ⅝" lumber core tore loose from the outer two plies.

This should not be construed as condemning this lumber core construction for wood products of all kinds. It can be used in homes, offices, schools, factories, and places where the maximum moisture content of the wood remains below 10%, such as occurs in moderate climates without outdoor exposure. But the test does indicate that this lumber core construction is not suitable for semi-outdoor use in warm humid climates, as in the tropics.

An enlarged view of the edge sections of A and C in Fig 2 is "blown-up" in Fig. 3, indicating that the wood away from the glue joint does appreciably expand, especially on the two outer layers. Where it is held by the glue in the joint, the end grain effect of the adjacent layer restrains the expansion. The extent of swelling in Fig. 3 is exaggerated to more clearly demonstrate the point at issue.

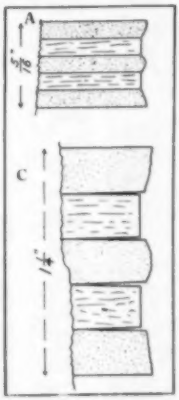

Fig. 3. Enlarged edge sections of Fig. 2.

The above series of demonstration tests, made by the writer many years

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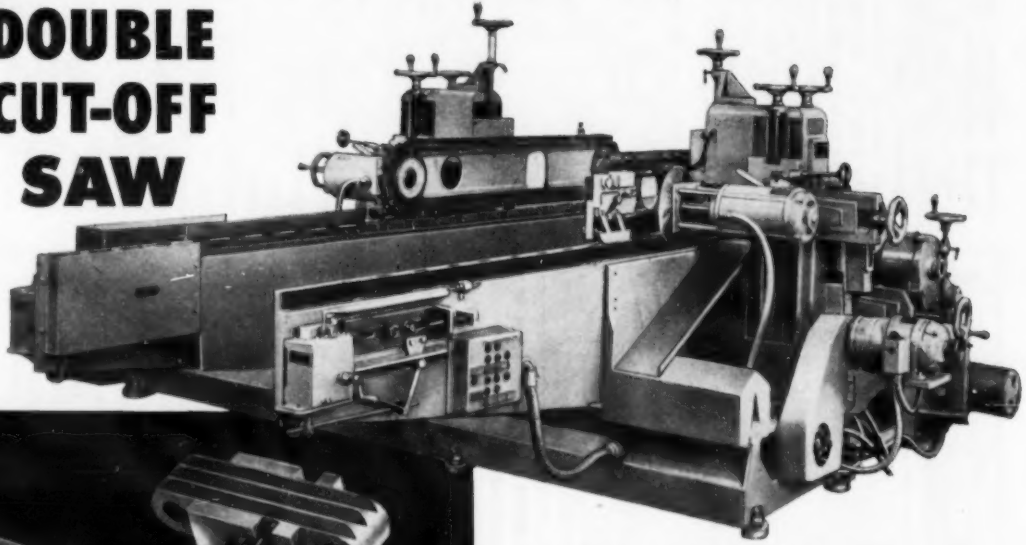

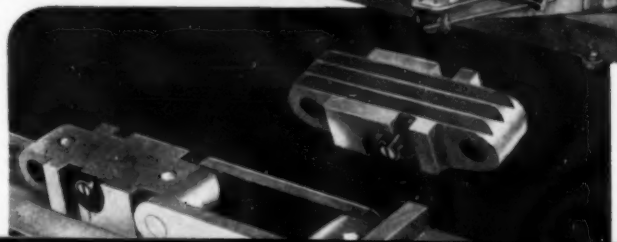

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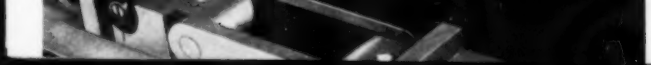

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ago, was eventually recognized in the "Commercial Standards for Hardwood Plywood, CS-35-49." These later tests were made on species of different densities, and as was expected, the power of expansion was found to be greatest on the denser species and was appreciably less on the low density woods. The construction requirements of this specification are shown in Table 1.

TABLE I. MAXIMUM ALLOWABLE THICKNESS OF VENEER LAYERS
U. S. Specification CS-35-49

Density and Species	Technical Type	Type 1
HIGH DENSITY	1/12"	1/8"
Birch Hard Maple Oak, Etc.		
MEDIUM DENSITY	1/10"	3/16"
Cherry Gumwood Mahogany Sycamore Walnut, Etc.		
LOW DENSITY	1/8"	1/4"
Basswood Cottonwood Poplar, Etc.		

Footnotes
Technical type: maximum waterproofness subject to marine and weather exposure, using top grade veneers.
Type 1: waterproof, subject to weather exposure using modified grade of veneers.
Lumber cores: not permissible in either of the above types.

Advantages of Dimensional Stability in Plywood

It has been shown that plywood properly designed and adequately glued is dimensionally stable. Technically this may not be quite correct, as there is a bit of come-and-go in the best made plywood, well under one tenth of 1%, since it is made of a porous material that is highly susceptible to moisture. For all practical purposes it is dimensionally stable.

The advantages accruing from this dimensional stability are many. Take the case of a door, whether it be in a small cabinet or a full sized door in a home. It is highly important that doors fit correctly, snug enough to close the opening, and free enough to swing easily under any indoor atmospheric conditions that may exist. Many of the flush plywood doors of today have semi-hollow cores, which lighten the weight on the hinges and are far less likely to slam than a heavier door construction. The alternate to these flush plywood doors is a panel door, with relatively narrow frame members and plywood panels. These may be slightly cheaper, but in many cases will not harmonize with modern designs, and they expose ledges that are difficult to keep clean. Unless the stiles and rails of such panel doors are of plywood, they present the hazards of shrinking and swelling, though to a lesser degree than slab doors made of solid lumber.

Drawer fronts are other instances where the dimensional stability of plywood is essential. It must facilitate good fitting, not too loose to rattle and look unslightly, nor too tight to stick and ruin the disposition of the user,

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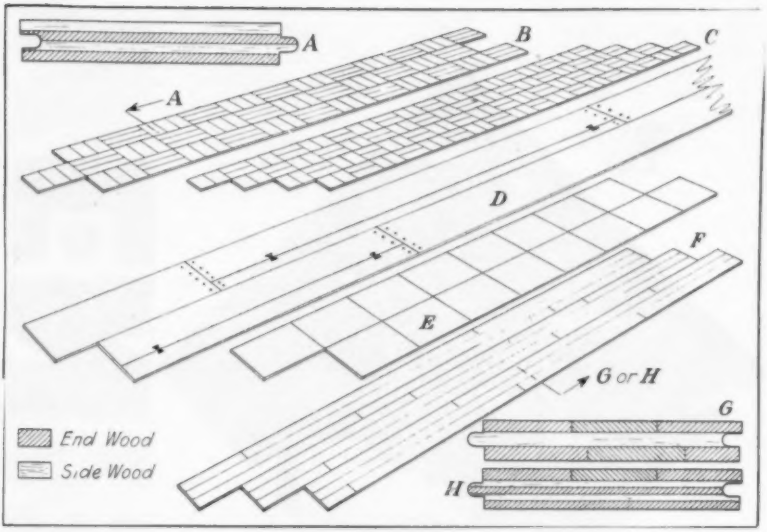


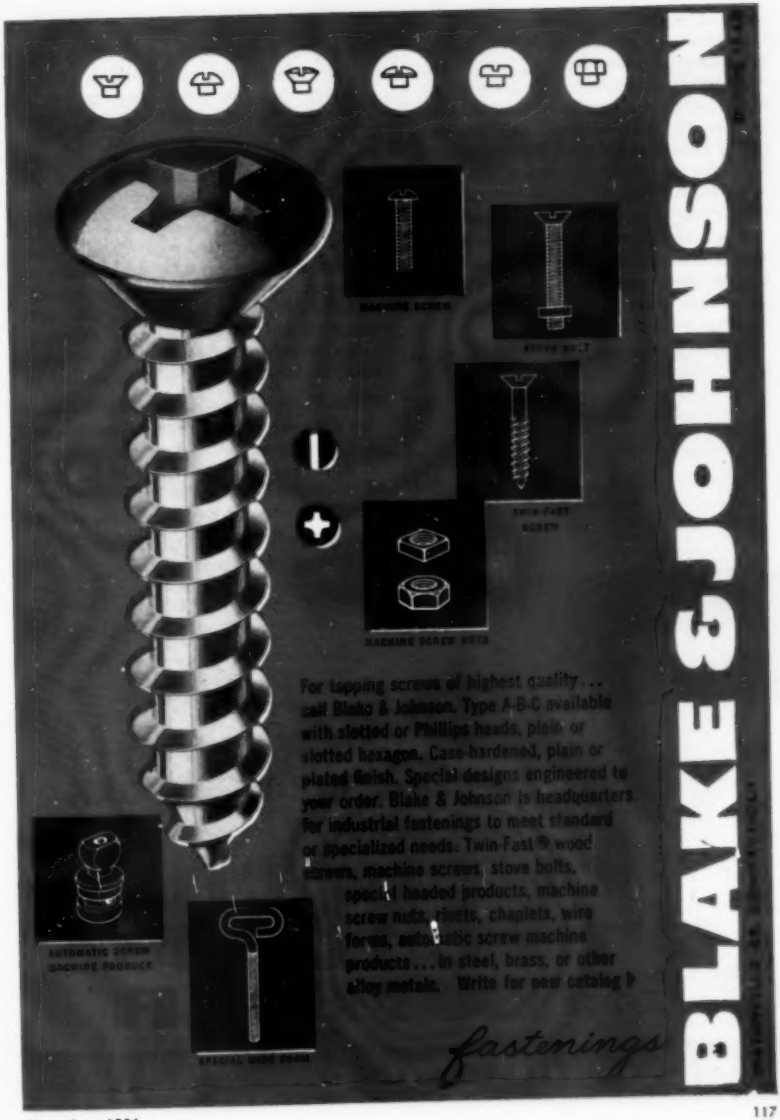
Fig. 4. Plywood Flooring.

A. Cross section of 5/8" 4-ply parquet flooring.
B, C, E. Face types of parquet flooring.
D. Plank flooring with plugs and butterflies, colonial designs.
F. Narrow strip flooring in 6" widths.
G, H. Cross sections of F; 3-ply and 5-ply.

not to mention defacing the framework through which the drawer slides.

Another example—tops for tables, bureaus, dressers and cabinets, where strips of lumber for solid tops can be glued edge to edge. Even where the exposure is no more than that produced by atmospheric conditions in homes, offices and schools during the various seasons, solid tops are likely to be a hazard. If made of dry lumber they tend to swell, to break their concealed fastenings and to warp. If, on the other hand, the lumber was not dry enough, the joints are likely to separate or cracks to appear, which destroy the attractiveness of the item, and often cause open joints and loose strips.

Plywood flooring with dimensional stability has been developed, but its higher cost has retarded its wide adoption. It provides an excellent remedy for the unsightly and unsanitary cracks that inevitably occur when floors are laid with solid boards. Obviously this is why hardwood flooring is regularly laid with such narrow strips, but even in a 3" wide board the shrinkage that may occur is from 1/16" up, which is enough to be troublesome. This may be exaggerated if the scrub woman is enthusiastic and generous in her use of soap and water. This tendency to shrink is particularly annoying in wide flooring boards, 8" to 12" wide. They are more often made of plywood than the narrow strip floors. These plank floors, with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random width boards, are an excellent reproduction of colonial designs, and are especially attractive in homes were colonial surroundings are desired. Another advantage in plywood flooring is that parquet squares can be made up in long strips at the factory, greatly reducing the costs of laying individual squares. An illustration of several types of plywood flooring is shown in Fig. 4.

The advantages of these types of plywood flooring more than offset their higher costs and there is every reason to believe that popularity of plywood flooring will grow.

There are many other applications where dimensional stability of plywood is of importance, and the examples given are typical of many others.

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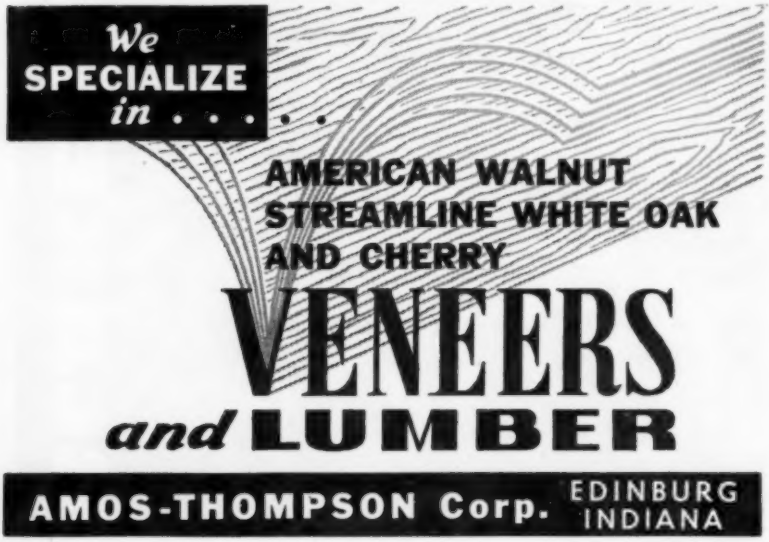
Consideration has been given, so far, to dimensional stability in width and length, where it is most important. The problems of slight variations in thickness, which cannot be offset in plywood constructions, are of relatively minor significance. Thickness factors, as in drawer fronts, doors, table tops and flooring introduce no problems of fitting. They are practically negligible in comparison with area factors.

Conclusions

The examples cited refer only to those applications where the advantages of plywood are related to dimensional stability. Plywood has many other outstanding advantages in other relationships, which will be separately emphasized in other articles in this series.

The comparisons made here, between the dimensional stability of solid wood and of plywood, should not be construed as applying to all parts and all types of wood products. There are many parts, mostly relatively narrow, such as legs, stretchers, frames and bracing members,



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where solid wood serves best, and where dimensional stability in width, thickness and area are not significant. However, where area is a factor, careful consideration should be given to plywood because of its dimensional stability.

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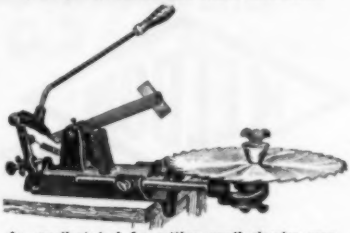

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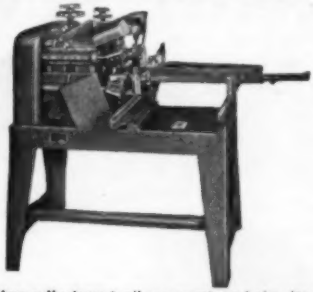

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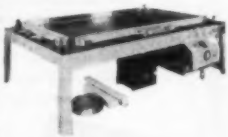

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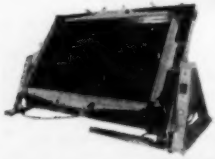

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IMPREG . . . For Patterns and Die Models

By Ray M. Seborg
and A. E. Vallier

WOOD is one of our few natural products that has been used throughout the history of mankind with almost no modification of its properties. Few materials have as versatile applications and have been as universally accepted as wood. Nevertheless, we know that for certain applications some properties of wood are not desirable, such as the tendency to decay when subjected to high moisture conditions, and the tendency to change dimensions with changes in moisture content.

The impregnation of wood with chemical preservatives greatly increases the resistance of the wood to decay. Even though the preservative treatment of wood is relatively new, having been developed chiefly during the last few generations, this process has been widely accepted by the wood industry.

Impregnation Increases Stability

The impregnation of wood with phenolic resins greatly increases the dimensional stability of the wood. The process of impregnating wood with phenolic resins to reduce moisture absorption and dimensional changes has been described rather extensively in many reports, magazines, and technical journals during the past two decades. The wood industry, nevertheless, has been slow in adopting this process to reduce the dimensional changes of wood. This fact may be due partly to the relatively high costs of the treated wood which has been produced primarily for rather specialized applications where its desirable properties can be utilized and where the relatively high costs of the wood can be justified.

Wood impregnated with phenolic resin-forming chemicals, followed by drying and curing the resin within the wood structure without the application of pressure, is known as impreg. This process is, however, chiefly limited to the treatment of thin sections of wood such as veneer, because of the difficulty encountered in obtaining uniform impregnation and in the subsequent drying of wood in lumber-size dimensions. Of course, laminated panels of any desired thickness can be built up from the treated veneer.

In the manufacture of impreg, the veneer is impregnated by forcing the resin solution into the sheets by the application of pressure or by soaking the veneer in the resin solution until the proper amount of resin is absorbed. The impregating resin should be a slightly polymerized phenolic resin, i.e., a resin of low molecular weight in which the resin molecules are sufficiently small to penetrate the cell wall structure. Only resin entering the cell wall reduces the shrinking and swelling; that deposited in the voids is of no value. Many resin manufacturers are now producing impregnating resins suitable for the stabilization of wood. The solids

Mr. Seborg is a chemist at the Forest Products Laboratory and Mr. Vallier is manager of the Experimental Fabricating Department, Ford Motor Co., Dearborn, Mich. This article was first presented at the national meeting of the F.P.R.S. and is reprinted with permission.

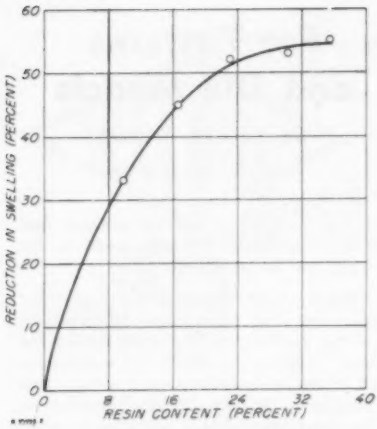

Figure 1.—Effect of resin content on the reduction in swelling of mahogany veneer between oven-dry and water-soaked conditions.

content of the resins made by different manufacturers vary considerably, generally ranging from 35% to 75%.

Impregnation Process

To obtain uniform impregnation throughout the wood without the absorption of too great a quantity of resin, the treating resins are first diluted with water to a solids content of approximately 30%. Veneer is impregnated by the application of pressure or by soaking in the resin solution until the weight of the solution absorbed is approximately that of the untreated wood, i.e., approximately 100% solution uptake. This will give a resin content of approximately 30% based on the weight of the untreated dry wood. The treated veneer is then solid stacked under non-drying conditions for approximately one day to allow time for the resin solution to diffuse into the wood structure before drying and curing.

The treated veneer is dried in a commercial veneer roller drier or in an oven or kiln that has circulating air. The drying temperature (less than 200° F.) is kept below the boiling point of water to prevent the solution and the dissolved impregnating agent from being forced to the surface of the wood during the early stage of drying by the steam pressure developed in the wood. Veneer in thicknesses up to ⅛" can be dried to a moisture content of from 10% to 15% in about 30 minutes in a roller drier. Considerably longer time is required if the veneer is dried in an oven or kiln. The resin in the dried treated veneer is then cured by heating at a high temperature. This is a time-temperature reaction; at 310° F. the curing time is approximately 30 minutes.

The treated and cured but uncompressed impregnated veneer can be glued with many of the same glues and gluing processes now used for gluing of untreated wood. It may, however, be necessary to vary certain gluing

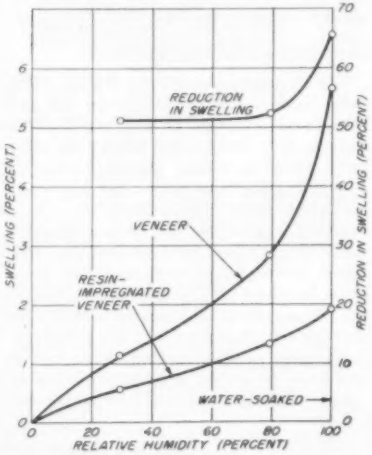

Figure 2.—Effect of resin impregnation on the reduction in swelling of mahogany veneer between oven-dry and various moisture conditions.

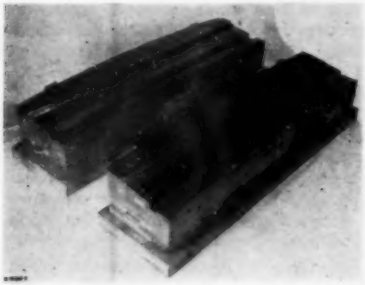

Figure 3.—Die model made from mahogany lumber and one made from resin-resin-impregnated laminated lumber (right).

conditions, such as the amount of spread, assembly conditions, and curing conditions somewhat from those used with the same untreated species in order to obtain the desired high-quality bonds of the treated veneers.

This treatment of wood will greatly reduce the moisture absorption, swelling, and shrinking of wood with virtually no sacrifice in paintability or thermal insulating properties, and with no serious effects on its gluability. Much less moisture is absorbed or passes through impreg than through untreated wood. The face checking of impreg under weathering conditions is markedly less than that of untreated veneer.

Except in hardness and compressive strength, which are slightly increased, the mechanical properties are not improved by this treatment. Toughness and impact strength are materially reduced. Decay resistance is greatly increased. This increase appears to be due to the fact that the cell walls of the treated wood cannot take up sufficient moisture to readily support decay. Limited tests of resin-treated specimens exposed to marine borer attack indicate that impreg may have good resistance to these marine pests. Also because of the reduced equilibrium moisture content of resin-treated wood, the electrical resistivity of the material has been greatly increased.

The acid resistance of impreg is high. Its fire resistance is not markedly greater than that of untreated wood. The resistance to heat, however, is greatly increased by resin impregnation. Impreg heated for 60 minutes at 300° F. and then for 60 minutes at each 25 degree increase in temperature up to 550° F. showed no significant charring or disintegrating of the wood until temperatures of 525° and 550° were reached. Also, impreg was heated at 400° F. for 1 hour and then allowed to cool. This cycle was repeated 35 times with no apparent disintegration of the wood. Untreated wood will char and disintegrate badly when subjected to these conditions of heating.

Uses for Impreg

Impreg has been used for military purposes such as housings for electrical control equipment in which its improved electrical properties were utilized. At present impreg is being produced for the construction of acid tanks, in which advantage is taken of its high acid-resistance property. Industry, however, has been slow to take advantage of the most improved property, dimensional stability, imparted to wood by resin impregnation.

At present, resin-treated wood has been chiefly used in its compressed form. This stable form of compressed resin-treated wood (compreg), which is highly compressed prior to the setting or curing of the resin, is sold under various trade names by the manufacturers of this product. Some of the applications of compreg with which we are familiar are tooling jigs and forming dies, cutlery handles, musical instruments, strain insulators (and other applications in the electrical field where a high-strength, high-dielectric material is required), electrical transformer

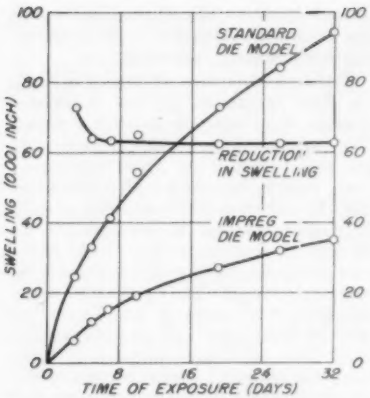

Figure 4. — Comparative dimensional changes of a die model made from mahogany lumber and one made from resin-impregnated laminated lumber. Data represent average of 24 measurements.

parts, spar and connector plates, shuttles and picker sticks in the textile industry, sporting goods, and decorative applications.

Considerable publicity has been given to the products that are currently being made from compreg. Until recently, however, industry has paid little attention to the possible uses of the uncompressed resin-treated wood (impreg), even though the lack of dimensional stability of the untreated wood has been a problem of major importance. In many of these applications the increased cost of impreg over that of untreated wood could be readily justified.

Impreg for Die Models

One of these applications is the use of impreg for die models in the automobile industry. Since the beginning of mass production of cars, the body parts have been stamped out by steel dies. In order to make the steel dies, models of the correct size and shape must be first made of wood. Since the wooden models determine the shape of the steel dies, it is highly important that these models do not change dimensions appreciably from the time the models are made until the steel dies have been completed and production has started. This period of time may vary from a few months to several years, and with changes in moisture conditions the dimensions of the wood models also change.

Changes in dimension in the wood models unless corrected would be reflected in the dimensions of the steel dies with the result that the final products (car body parts) would not fit together exactly as designed. Frequently these changes may be of sufficient magnitude to require reworking of the entire surface of the models. Since each step in the engineering and tooling for production of a new model is closely timed, any delay is costly from a time and monetary standpoint. The fact that wood changes in dimensions with changes in moisture content therefore presents a serious problem, and one which has been faced with difficulty for the last 40 or more years, in the automobile industry.

Most of the efforts that have been made to eliminate or reduce this difficulty involve attempting to prevent mechanically the entrance and exit of moisture with surface coatings such as paint, varnish, water repellents, and related products. These treatments have proved effective in retarding the rate of moisture changes, and are therefore effective in reducing changes in moisture content and dimensional changes when exposures to high or low moisture conditions are for short periods of time. Since surface coatings only affect the rate of moisture absorption and do not significantly change the amount of moisture that the wood can absorb, this type of treatment is not effective in reducing the moisture, changes in moisture content, or dimensional

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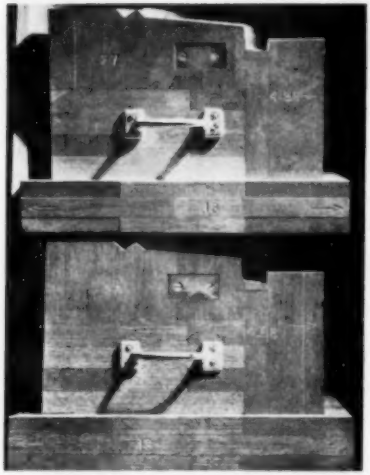

Figure 5.—End view of die models showing surface irregularity of standard die model (upper) after exposure to 90 per cent relative humidity for one month. Shadow lines on end of top model are due to differential swelling of the adjacent boards in transverse and longitudinal directions.

changes of wood when exposed to long humidity-change cycles such as seasonal changes.

The most effective means of reducing the equilibrium swelling and shrinking of wood that has been found up to the present time is the foregoing process of bonding and fixing active chemicals within the cell-wall structure of wood. Phenol-formaldehyde is, to our knowledge, the most effective resin-forming system that is practical to accomplish this objective.

The Ford Motor Company sponsored a research project at the Forest Products Laboratory to determine the suitability of using impreg for making of die models and patterns.

The properties of impreg, in general, have been well established. However, the effect of phenolic resins on mahogany for this particular application had yet to be determined. Tests were therefore made to determine the effectiveness of resin impregnation in reducing dimensional changes of the veneer, the laminated panels, and the completed die models. The effect of resins on the gluing and carving properties of this material were also determined.

The effect of varying amounts of resin on reduction in swelling from oven-dry to water-soaked conditions is shown in figure 1. The resin content was based on the weight of the untreated oven-dry wood. The dimensional stability increases with increase in resin content up to approximately 30%, at which point a reduction in swelling of 50% to 55% was obtained. Additional amounts of resin do not significantly increase stabilization.

The effect of resin impregnation on the reduction in swelling of mahogany veneer between oven-dry and various moisture conditions are shown in figure 2. A reduction in swelling of 50% to 55% was obtained when the swelling was determined between oven-dry and 30% or 80% relative humidity. The reduction was considerably greater, approximately 65%, when the swelling was measured between oven-dry and water-soaked conditions. The reduction in swelling is still greater when the swelling is determined between 80% relative humidity and water-soaked conditions. Under these conditions the percent swelling (as indicated in the graph), is 0.6 for impreg and 2.8 for the untreated veneer. The amount of swelling of the resin-treated veneer is, therefore, only 21.5% of that of the untreated veneer. This is a reduction of 78.5%. This high degree of stability at the high moisture levels is important when the models come in contact with wet materials such as plaster of

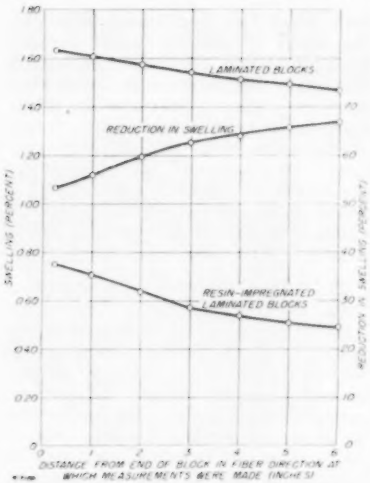
LAMINATED BLOCKS
REDUCTION IN SWELLING
RESIN-IMPREGNATED LAMINATED BLOCKS
SWELLING (PERCENT)
REDUCTION IN SWELLING (PERCENT)
DISTANCE FROM END OF BLOCK IN FIBER DIRECTION AT WHICH MEASUREMENTS WERE MADE (INCHES)

Figure 6.—Comparative swelling of resin-treated and untreated laminated blocks (6 x 6 x 12 inches) when exposed to 80 percent relative humidity for 112 days after prior conditioning to equilibrium in 30 percent relative humidity. Data represent average values for radial and tangential measurements.

Paris in the making of duplicate casts and plastics in the making of duplicate models.

Since the standard die models are built up from mahogany boards, this practice was followed in the fabrication of impreg die models, that is, the treated veneer was first made into boards or panels of comparable thickness and width of mahogany lumber. A conventional hot-press phenol resin glue was used in gluing the veneer into panels. Impreg die models were then built up from these panels using a room-temperature-setting resorcinol resin as the bonding agent.

Research Project for Impreg

The first batch of impreg for this application was made at the Forest Products Laboratory. This batch consisted of approximately 200 board feet of laminated panels. Each panel was laminated from 17 plies of 1/16" sliced Honduras mahogany (Swietenia) veneer. Later tests have shown that either well-cut sliced or rotary-cut veneer in thicknesses up to 1/10" is suitable for this application.

From this material the first impreg die model was made by Deutsch and Sons Pattern & Machine Works, Milwaukee, Wisconsin. A comparable model was also made from mahogany lumber (see figure 3). Both models were subjected to 90% relative humidity at 80° F. for a month and then to 30% relative humidity for the same length of time. The dimensional changes were determined periodically. The comparative dimensional changes of the two die models when subjected to 90% relative humidity are shown in figure 4. Each value represents the average of measurements made at 24 different positions on each model. The results show that a 65% reduction in swelling was obtained for the impreg models. Similar values for reduction in shrinking were obtained when the models were subjected to 30% relative humidity.

The irregular surface, resulting from swelling during exposure to 90% relative humidity can be readily observed on the end section of the standard model (see figure 5). This irregular surface (indicated by shadow lines) is the result of differential swelling of the adjacent boards in transverse and longitudinal directions. No surface irregularities are noticed on the impreg model.

Impreg Blocks Tested

Impreg blocks (6" x 6" x 12") were also made from mahogany lumber and from the impreg panels. These blocks were subjected to a moisture condition of 80% relative humidity for approximately three months. Dimensional changes in the two directions, parallel

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to, and across the laminates were determined at various distances from the end of the blocks. The results (see figure 6) show approximately 65% reduction in swelling for the impreg blocks. The decrease in the amount of swelling for each successive point of measurement from the end of the block indicates that equilibrium swelling throughout the block had not been attained in this period of time.

The greater degree of stability of the impreg die model and impreg block as compared to that of the treated veneer is at least partly the result of laminated construction which in itself tends to reduce dimensional changes.

Dimensional Changes

The reduction in dimensional changes of phenolic-resin-impregnated wood is not affected by the length of time of exposure to humidity conditions, as the equilibrium moisture content of the wood is permanently reduced by this treatment. This effect is apparent by the fact that the reduction in swelling of impreg blocks over a period of three months was the same as that obtained for the impreg model for a period of thirty days. While the stability of die models has not been determined over long periods of time, it is reasonable to assume that the dimensional stability of the impreg models is as permanent as the stability of the impreg veneer and panels from which they are made.

It has been emphasized that impregnants which do not penetrate the cell wall of the wood fibers do not permanently reduce the equilibrium moisture content of the wood. They, therefore, are not effective in materially reducing dimensional changes that occur over long periods of time. They are commercial processes using water repellents and other impregnants together with wood preservatives that are effective

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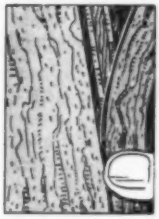
in reducing moisture absorption, dimensional changes, and decay of wood in application where shedding of liquid water is a factor. However, at this time we know of no impregnant that is as effective, economical, and practical to use as phenolic resins in application where a high degree of permanent stability is required.

In the fabrication of models from untreated mahogany lumber, polyvinyl resin glues are currently being used for gluing the boards together. This type of glue depends on the partial loss of moisture to the wood, that is, the partial drying of the glue to give a good initial bond. Such a glue appears to be satisfactory for gluing untreated wood that will absorb moisture from the glue sufficiently rapidly to give a satisfactory bond during the desired pressure period. This type of glue, however, was found to be unsatisfactory for the bonding of impreg panels, since the absorption of water by the treated wood is too slow and incomplete to give a good bond during the period of time that the material is clamped together. It has therefore been necessary to use a glue that does not depend primarily on the absorption of moisture by the wood to give a good glue bond. The various thermosetting resin glues, which harden or cure by undergoing a chemical reaction, naturally suggest themselves for such an application. Such glues which are capable of reaction at normal room temperatures are most desirable. A resorcinol resin that sets up at a room temperature of 70° F. or higher has proven satisfactory for this purpose when properly used. Certain other types of glues are under investigation.

Die Models

This study on the suitability of impreg for die models has shown that impreg is far superior to normal wood



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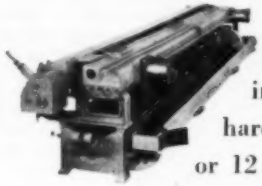
for this application. At the present time comparative exposure tests at 90% relative humidity and 80° F. are being made at the Forest Products Laboratory on two roof die models, one which is made from impreg and one made from conventional mahogany. A roof model was chosen because it is one of the biggest die models made and also experience has shown that it will move extensively due to moisture changes. The tests are nearly completed and the measurements to date indicate that the use of impreg in this size die model reduces the movement of the wood to a degree equal to and possibly greater than was experienced in the smaller die model.

Several die models for the 1956 model cars have been made from this material. The use of models from this new material will enable the tool manufacturers to take from the die model as many plaster or plastic casts as desired without experiencing any change of dimension or extortion of the original model. Also, from a practical usage standpoint the model will be dimensionally stable throughout its life.

Making die models from this material will also allow the automotive industry the opportunity of using to a greater extent duplicate plastic die models. This is because the original model made from impreg will not change dimensionally due to the application of plastic over it.

The Ford Motor Company has made from impreg, wood crankshaft patterns that were used to make experimental shell-molded crankshafts. In this application advantage is taken both of the dimensional stability and heat resistance properties of this material inasmuch as the pattern is heated for the duration of an hour to 400° F. before the mixture is set and resin is applied. The shells obtained are very satisfactory and the use of impreg in this experimental application appears promis-



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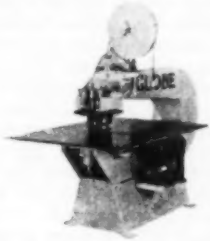

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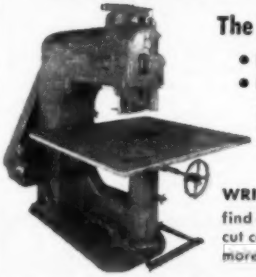

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ing. Also, the Ford Motor Company is experimenting with impreg for the construction of other types of wooden patterns. From this experience, we believe, that impreg will eventually replace conventional mahogany and other woods for the construction of previous patterns.

There is no question that impreg boards will be higher in price than conventional mahogany boards of the same dimensions. However, comparisons between board costs is very misleading. The cost of the lumber in a die model or pattern is a small percentage of the model because the greater portion of the cost is skilled labor. Also, it is necessary to use less board feet of impreg due to the fact that it is a finished board and not rough lumber. Approximately 20% or more of the major cost in a die model is spent in correcting dimensional movement during its construction which the use of impreg will eliminate. The impreg that has been used to date has been made on pilot or experimental equipment. We believe that when impreg is available in commercial quantities that finished die models and patterns made from it will be comparative in total cost with models and patterns made from conventional mahogany boards.

It was so tough for Joe to get up mornings that he went to his doctor who prescribed a pill. Joe took the pill, slept well and was awake before he heard the alarm clock. He dressed and ate breakfast leisurely. Later he strolled into the office and told the boss:

"I didn't have a bit of trouble getting up this morning."

"That's good," replied the boss, "but where were you yesterday?"

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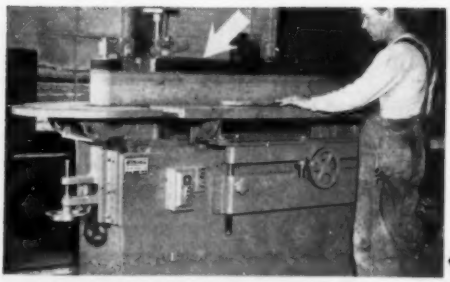

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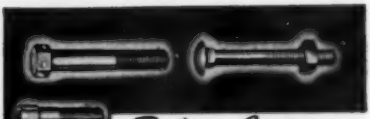

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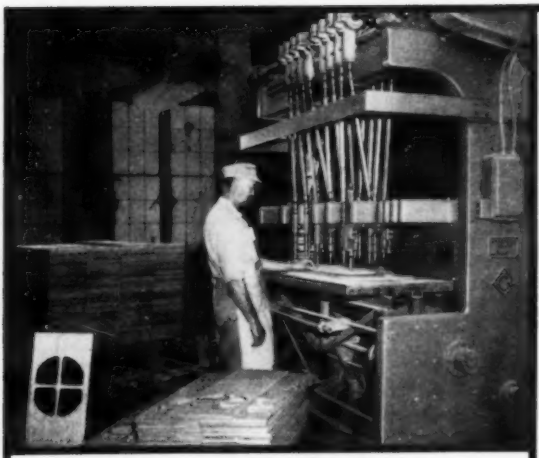

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Write for Bulletin 386 GREENLEE BROS. & CO.
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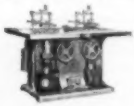

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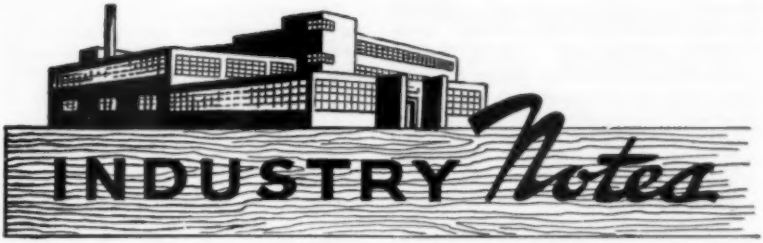


SHORT COURSES

The State University of New York College of Forestry in Syracuse has scheduled four short courses for woodworking industry men during the next academic year. The courses are a part of the College's extension program aimed at sharing results in wood research with the public.

Professor Russell C. Deckert, industry service representative for the College, announced that the dry kiln operation course will be held January 24 through 29; the wood gluing course on the same dates; the hardwood lumber grading course, April 12 through 15; and on the same latter dates, the quality control course. He emphasized the importance of early registration as the best assurance of being accepted into the limited classes.

Limited to 20 students, the 38th annual dry kiln course will include all phases encountered in the seasoning of lumber and wood products. In addition to lectures and classroom discussion, the participants actually will dry a charge of lumber in the College's dry kiln. Fee for the course is $75.

The wood gluing course will be limited to 12 students. The course will provide intensive instruction in the proper selection of wood glues and in the various manufacturing processes used to bond wood. The fee is $75.

Handled mainly by an official inspector from the National Hardwood Lumber Association, the hardwood lumber grading course will school 20 individuals thoroughly in official grading rules and will provide practice in actual grading. The fee for the course is $35.

The quality control course, limited to 12 persons, will provide instruction in the nature and application of the powerful engineering tool available in statistical methods. The students will learn the techniques of keeping individual stages of manufacture within control. The fee is $50.

UNIQUE SERVICE

Now, for the first time, the Veneer Lumber & Plywood Company 2637 S. Throop St., Chicago, has what it believes to be the most complete service in meeting the needs and demands for beautiful interior woodwork. This company is offering to the trade over 30 different woods available in wall paneling; a wood to meet the needs of every purse; the finest architectural specifications or to blend in with any atmosphere. Such rare woods as paldao, algarrobo and narra, are available for those who want the unusual, and for those who want the conventional, pecky cypress, wattled walnut or butternut will give the informal effect.

The company has also taken steps to have doors and plywood to match some of their rare woods. To make their service complete, they also manufacture moldings and matching trim in the firm's millwork plant.

TRUAX HONORED

T. R. Truax, 3813 Council Crest, Madison, Wis., chief of the Division of Wood Preservation at the U. S. Forest Products Laboratory at Madison, was

granted an honorary degree of Doctor of Agriculture recently at Iowa State College.

Dr. Truax supervises research at the laboratory on means of protecting wood from decay, fire, and insects; techniques of manufacturing veneer, plywood, and laminated wood products; and glues, paints, and fire retardants.

His work has gained international recognition. Tests that he developed are standard for determining the effectiveness of fire-retardant chemicals and he is author of many publications on the gluing of wood.

GLUE SCHOOL

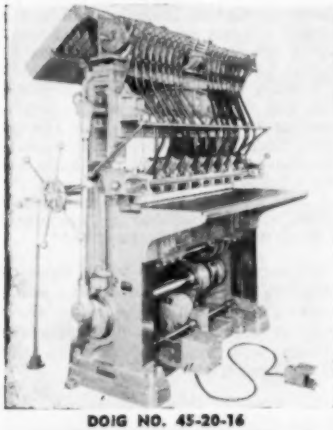
The next Teco glue school, the intensive five-day course in wood adhesives and modern gluing and laminating techniques, will be held December 6-10, at the laboratory of Timber Engineering Company research affiliate of the National Lumber Manufacturers Association.

The course is conducted for the benefit of management and production personnel in the furniture, woodworking, structural and marine laminating, and other wood-using industries, as well as for government and military personnel dealing with wood products. It is designed to help trainees improve their products, increase production, save time, material and labor, and otherwise develop a more profitable operation.

The class is limited to 15 enrollees, with acceptance on a first-come, first-serve basis. Complete information and application forms may be obtained, without obligation, from R. C. Cranch, Timber Engineering Company, 1319—18th St., N.W., Washington 6, D.C.

Prosecutor: "Now tell the jury the truth, madam. Why did you shoot your husband with a bow and arrow?"

Defendant: "I didn't want to wake the children!"



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APPOINTMENTS

Behr-Manning Corporation, Troy, N.Y., announces the appointment of **B. J. Riggs** as general traffic manager to succeed Harry N. VanAntwerp, now retired. Mr. Riggs has been in traffic management for the last several years.

Walter S. Snodell has been appointed sales manager of the Special Products Division of the Acme Steel Company, Chicago. He succeeds W. M. Minehart who is retiring after 38 years with the company. Mr. Snodell has been with the firm for 22 years.

Atlas Plywood, Boston, Mass., has named **Stanley R. Venne** of Escanaba, Michigan, as vice-president in charge of all sales. He has been serving the company as vice-president in charge of the mid-central division.

Appointment of **Carl J. Meister** as vice-president, sales of the Atkins Saw Division of Borg-Warner Corp., has recently been announced. Formerly Mr. Meister was with the Atlas Chain and Manufacturing Company.

Joseph R. Kristufek has been named as manager of the Detroit Branch warehouse of the Aetna Plywood & Veneer Company. Kristufek is an experienced plywood executive having worked with several other plywood companies before coming to Aetna.

TRADE CHARACTER GOES 3-D

The deep-chested, bulging muscled Durham Rock Hard All-Around Repair Champ, familiar figure on milions of cans of Rock Hard Water Putty, went "3-D" recently, when the company produced figurines of the trade character, well known to the hardware, lumber and paint trade throughout America and Canada.

The figurines, which are made of the Company's plastic repair material are now familiar characters at trade shows throughout the country.

1953 was the biggest volume year in the 30-year old company's history, and sales of Durham's Rock Hard, in the first two months of 1954, exceed those of a year ago, according to Don Durham, president of the Des Moines company.

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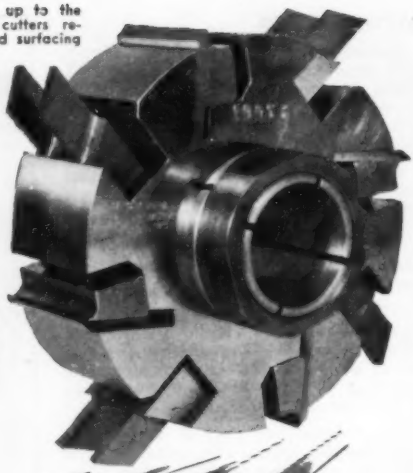
This Splitter Head is made in any length, up to the width of the machine. With the splitter cutters removed, the round head becomes a standard surfacing head.



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Fact is, Diehl Design Engineers solve the trickiest splitting problems—as well as all other cutting problems, too—with their wide knowledge and skill in all phases of wood processing.

For example, Diehl designed this Splitter Head primarily to surface flat stock and cut it into multiples, such as the three square dimensions shown. However, these Splitter Cutters can be made in various forms to produce V or beaded ceiling; for grooving stock, such as drawer sides; or for rounding the corners on casing or like patterns. And, the head shown above can be adapted to efficiently handle these last three operations on small quantity runs. For large quantity, high speed work, special Diehl designed heads, of course, are required. To eliminate your splitting "headaches," write today for full details on Diehl Cutters and Cutterheads.

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SHEARMAN CUTS COSTS

How to reduce drying costs and get better quality seasoned lumber is not a new problem to furniture manufacturers. The method used by one of the leading manufacturers in the Jamestown, N.Y., furniture industry to solve that problem is revealed in the story of Shearman Brothers Company.

This organization is regarded as one of the oldest and most prominent manufacturers in this furniture producing area. Management was formerly handicapped by not having sufficient drying capacity to meet their production needs. Also, fuel demands during cold weather were so great that they could not adequately heat both the dry kiln and other plant buildings at the same time.

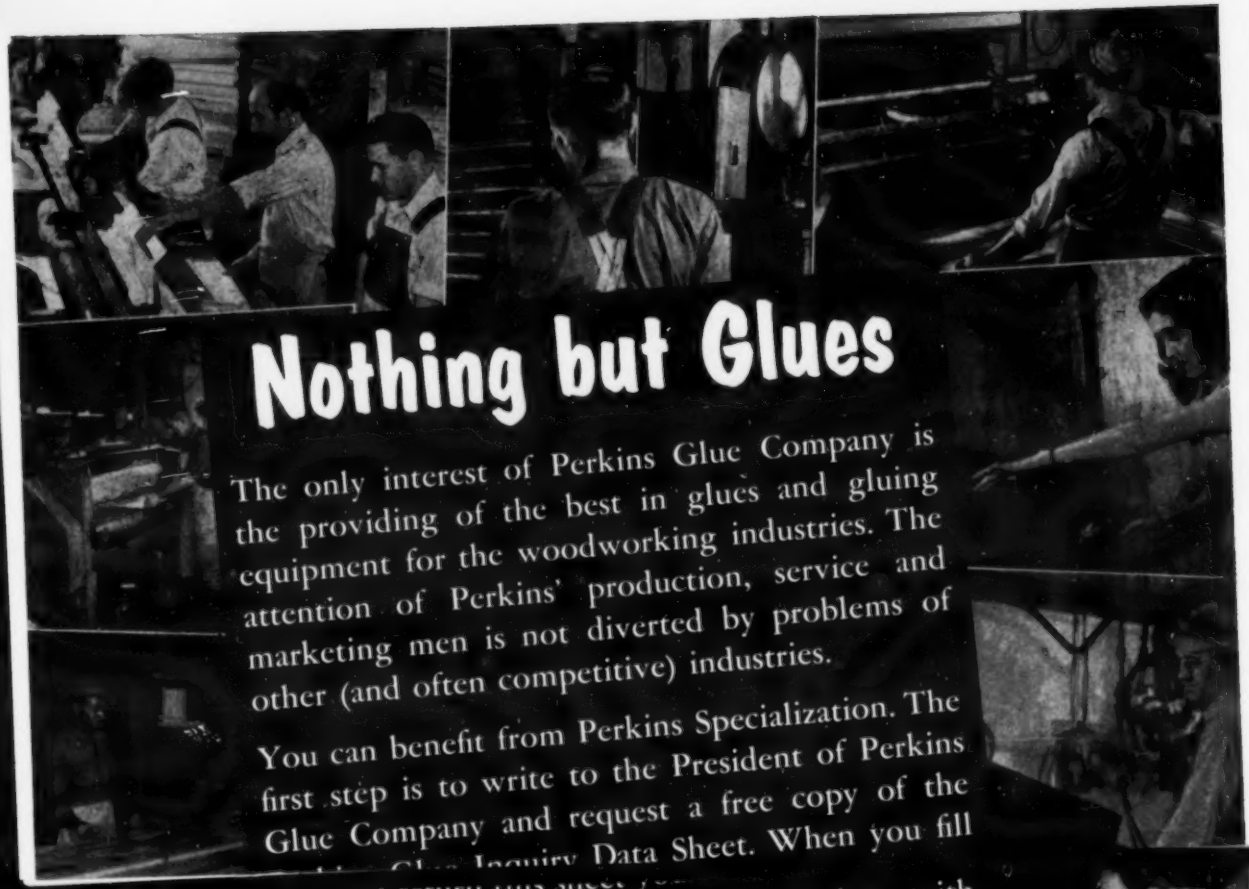
To assure their woodworking shops of an adequate supply of quality seasoned lumber at all times, Shearman Brothers decided to convert their old-type cross-piling kiln to the Moore cross-circulation system. By utilizing existing kiln building and metal equipment, they were able to hold modernization cost to a minimum—and here are some of the benefits they are now getting:

Management reports they now have greater drying capacity with the modernized kiln, and have reduced drying costs, although the present kiln is less than half the size of the old-type kiln.

For example, the converted Moore kiln takes about half the time needed to dry a charge of lumber, without the necessary forcing that was previously required, and the company is saving about 30% in fuel costs. Loss due to checking, warping and honeycomb has also been greatly reduced, giving a greater percentage of usable lumber.

The Moore cross-circulation kiln is 18 feet wide by 23 feet long, with fan and heating systems located overhead. Drying elements are controlled and

Shearman Brothers Co., Jamestown, N.Y., have cut drying time in half by converting old-type kiln to Moore Cross-Circulation System. Inset shows Albert C. Anderson, in charge of kiln drying at Shearman's plant.



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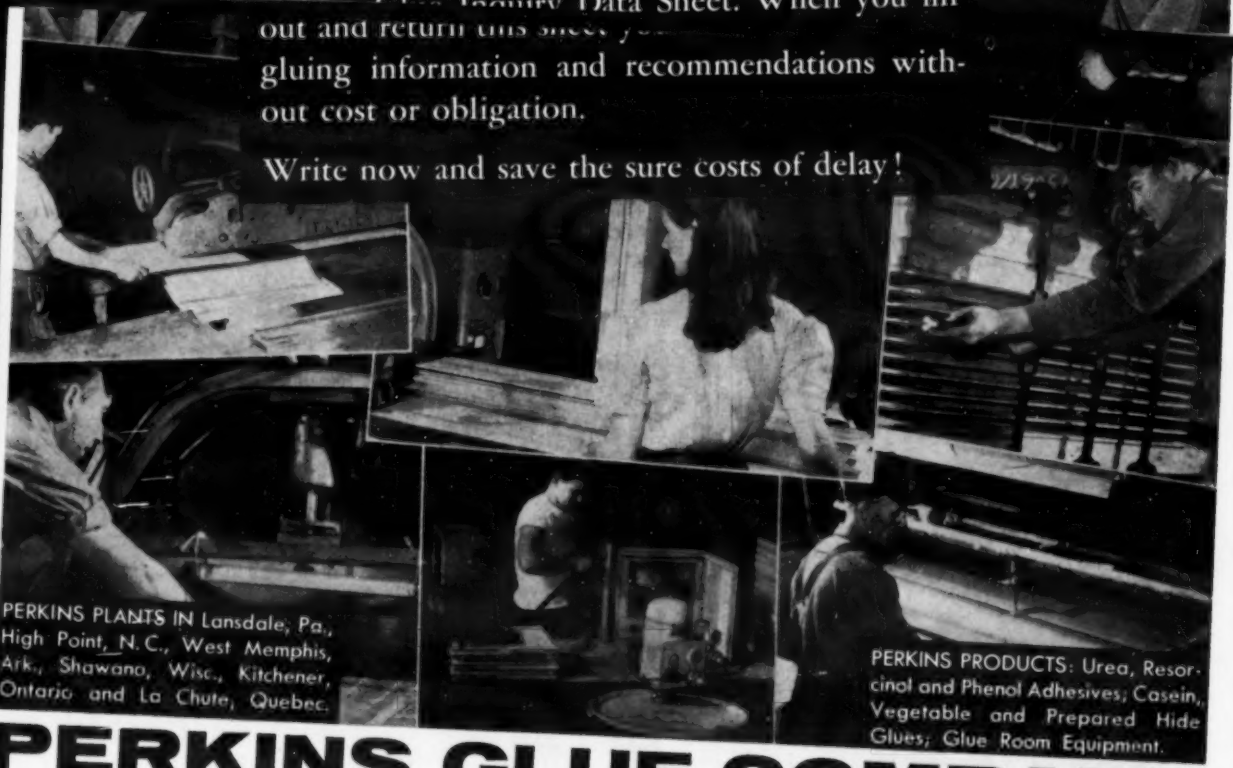
The only interest of Perkins Glue Company is the providing of the best in glues and gluing equipment for the woodworking industries. The attention of Perkins' production, service and marketing men is not diverted by problems of other (and often competitive) industries.

You can benefit from Perkins Specialization. The first step is to write to the President of Perkins Glue Company and request a free copy of the [illegible] Glue Inquiry Data Sheet. When you fill out and return this sheet [illegible] and recommendations with-

Glue Company and request a free copy of the [illegible] Data Sheet. When you fill out and return this sheet [illegible] gluing information and recommendations without cost or obligation.

Write now and save the sure costs of delay!



PERKINS PLANTS IN Lansdale, Pa., High Point, N. C., West Memphis, Ark., Shawano, Wisc., Kitchener, Ontario and La Chute, Quebec.

PERKINS PRODUCTS: Urea, Resorcinol and Phenol Adhesives; Casein, Vegetable and Prepared Hide Glues; Glue Room Equipment.

PERKINS GLUE COMPANY

Lansdale, Pennsylvania

recorded with a Moore autographic recorder-controller, which is also equipped to control roof ventilation automatically.

A partition wall was constructed in the old kiln building to accommodate the shorter length kiln, and the remaining area has been converted to dry storage.

Shearman Brothers handles a wide variety of hardwoods, including mahogany, maple, cherry, gum, poplar and elm, in thicknesses from 4/4 to 12/4. Production is devoted exclusively to the manufacture of high quality upholstered sofas and chairs for the home, office, hotel and club, in fabrics, leather and plastics.

This is one of the few upholstery manufacturers handling the complete job in one plant—starting with the drying of lumber, cutting and assembling the frames, finishing, spring-setting and upholstering on their own premises.

Slow-growth maple is used principally for the frames, with the lumber kiln dried to a moisture content between 5% and 9%. All joints are double-dowelled with hardwood spiral-grooved dowels wherever possible, and glued with hot animal glue.

Only a limited number of display items from Shearman's exten ive line is carried in stock by their dealers—the

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EASED EDGE HEAD
for clean, fast, low-cost
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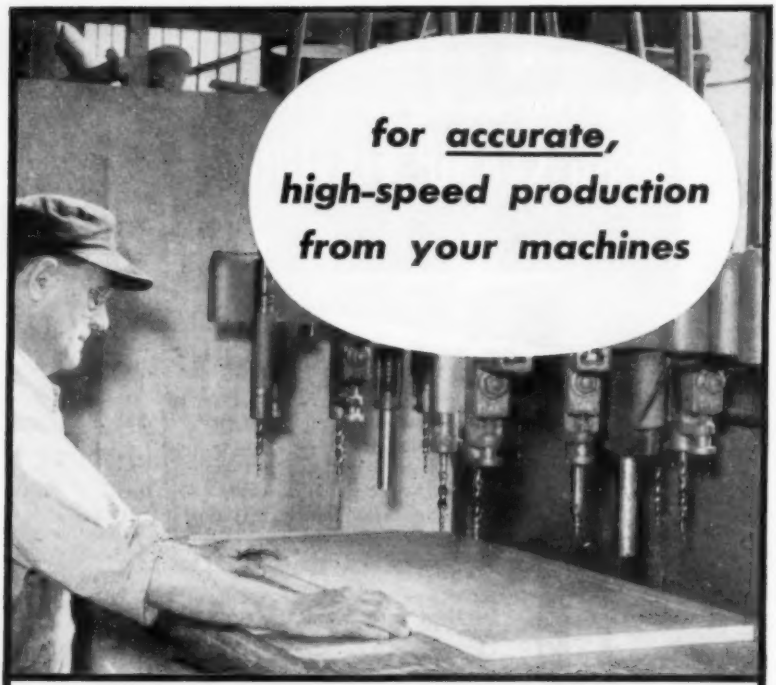
customer may select the style, type of finish and upholstery, and have the article custom-made to his order. Employes are quality-minded, being experienced craftsmen with an average length of service of more than 15 years with the company.

Shearman Brothers' leadership in the furniture industry has been gained through the school of long experience. It is believed to be the oldest firm under one continuous family management in the Jamestown area. The company was established in 1880 by Rufus and Addison Shearman. A grandson of one of the founders, John C. Shearman, who has been active in the management since 1909, is president of the company today. Mark Lundquist is superintendent, and Albert C. Anderson, foreman of the machine room, is in charge of kiln drying.



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KILN DRYING Forum

Question

I have been told that I can control the amount of shrinkage in my lumber by regulating the speed of drying. Is this true?

Answer

A commercial kiln drying expert provides this answer to your question: "Disregarding casehardening and assuming no collapse, there is no difference in the amount of shrinkage brought about by either fast or slow drying. The shrinkage that accompanies the drying of wood is accepted to be directly proportional to the extent of drying. Thus, to a comparable moisture content, slower drying cannot reduce the amount of shrinkage nor can speedy drying cause greater shrinkage."

Question

We have just started to kiln dry redwood lumber and have already run into stain which seems to be objectionable to the trade where natural finishes are required. Can you tell us what causes this stain?

Answer

The following contributory staining conditions are contained in a study of redwood stain reported in the "Drying of California Redwood" manual prepared by the Redwood Seasoning Committee of the California Redwood Association: "Too high kiln temperature, too high kiln humidity, too thin or too wide stickers, too low circulation rate in the kiln, and too high acid content of the wood."

Question

Although I have made arrangements for our yard crew to segregate all lumber piled on kiln trucks according to established moisture content ranges and species, we keep on getting charges of lumber with widely different moisture content ranges. How do other plants prevent this confusion?

Answer

A southern plant which stresses quality control through all operations, pre-set moisture content ranges that are most effectively and economically dried in a single charge and all lumber is sampled as it is stacked on kiln trucks. Each truck load is marked with a colored tag to show range of moisture content, using one color for each 10% in moisture from 18% to 68% and one color for all above 68%. Thus, it is possible to segregate trucks of a similar color for a single kiln charge of about the same moisture content. Trucks containing the highest allowable moisture content in a single charge are placed in the center of the kiln.

Question

What is the proper length and best method of preparing kiln samples?

Answer

Although no claim is made that this is the best method, an efficient method which has consistently produced good results involves selection of five representative boards as each kiln truck is stacked, cutting samples from the center of these boards and placing unused portions in the stack. After a moisture section has been cut from each sample, the five samples are set in the stack nice in spaces provided for them and marked. Based upon the computed moisture value of the load, that sample nearest to that value is selected as the sample for that load. A section about 30" long is cut from the sample board at

least 2" from the end and a wire brush is used to remove all splinters, bark, etc. Each sample is given an end coating of an aluminum paint-varnish solution and placed in a space left open for it about half way up on the side of the stack.

Question

Do you know of a good safe drying schedule for rosewood handle stock that we can use to kiln dry this stock to a moisture content of about 8% with a minimum of degrade?

Answer

A drying schedule developed for Brazilian rosewood blocks in the course of a study made at the University of Maine, which is said to have resulted in only 12.8% rejects—10.8% with mild checking and 2% with severe checking, might be used as a guide for developing a suitable schedule.

Moisture Content %	Dry Bulb Degrees F.	Wet Bulb Degrees F.	Relative Humidity %	E. M. C. %	Time Hours
Green to 30	140	136	89	16.9	24
30 to 25	145	135	75	11.8	3
25 to 15	150	130	57	8.0	19
15 to final	170	125	28	3.7	28
Conditioning	170	150	60	7.8	16

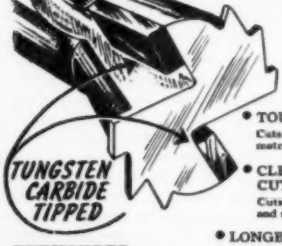
Question

I know that everyone is supposed to be operating a fan kiln of some sort today and drying schedules are all arranged for forced circulation kiln drying. The fact remains that I have a natural draft kiln and dry hard maple in 4/4 and 5/4 thicknesses. Do you know of a good schedule I can use in this type of kiln?

Answer

This schedule is recommended by an-

Sensational NEW Dovetail BIT!



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other natural draft kiln owner who states that while it will not produce drying speed of the modern kiln it will produce a good quality of drying maple lumber with the highest speed possible in the natural draft kiln.

Moisture Content %	Dry Bulb Degrees F.	Wet Bulb Degrees F.	Relative Humidity %
Green to 45%	125	116	75
45 to 40	130	119	71
40 to 30	135	121	65
30 to 25	140	123	60
25 to 20	145	125	55
20 to 15	150	125	48
15 to final	160	125	37

Question

In drying 4/4 black gum green from the log I get good results with a fairly high temperature and relative humidity of about 75% but run into checking trouble with 8/4 lumber with the same treatment. Is it common practice to use different schedules for the two thicknesses?

Answer

Reference to kiln men drying black gum reveals that a higher relative humidity is required for drying 8/4 black gum, in the range of 85%, when initial high temperatures are used, to prevent checking. They report, however, that relative humidity can be lowered substantially and rapidly after a 30% moisture content has been reached.

Question

I want a low pressure boiler to heat our new kiln and the boss wants to install a high pressure boiler. I have got him to a point where one good push will bring him over on my side. Please give me just one good argument.

Answer

Management is always receptive to substantial capital investment savings, so you might point out that there is usually a spread of at least $1000 between the two boilers. Possibly, the clincher could be the fact that steam tables show that steam at 5 lbs. gauge contains 956.5 Btu of latent heat of vaporization while steam at 100 lbs. gauge contains 876.3 Btu.

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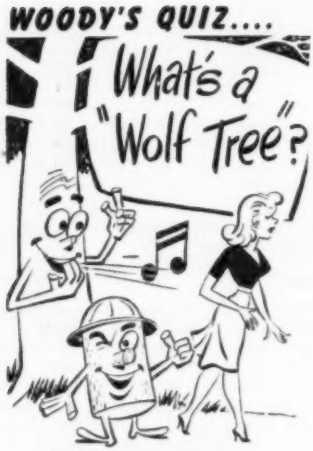

In loggers lingo a "wolf tree" is limby and of low value. It takes up a lot of space where better quality trees could be growing.

On industrial Tree Farms there is no place for wolf trees. With 5,000 technically trained foresters on their payrolls, America's wood using industries are growing and harvesting continuing crops of trees for lumber, pulp, paper and other forest products.

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Question

We recently switched over to unit packaging of lumber and fork lift truck handling at our plant. What bothers me is when kiln trucks are loaded with lumber packages, the bolsters between the packages leave wide spaces for air circulation losses. Two of these spaces are so formed in every kiln truck stack, with another at the bottom where bolsters are placed on the truck bed. Is it necessary to baffle these spaces for uniform drying?

Answer

From reports received to date, it would seem that few kiln men try to baffle these spaces. Only one plant reported baffling, which is done by screwing bolts into the end of the bolsters and hanging baffle boards over these bolts by means of large screw eyes screwed into the edges of the baffle boards.

Question

Our kiln design is such that fans operate under the tracks. What is the best method of supporting these tracks in the kiln to permit adequate air circulation at all times?

Answer

A method of supporting kiln trackage that is said to afford adequate circulation of air is comprised of a foundation made up of a series of round steel posts carrying a wide flange base, with the framework tied together with heavy braces running horizontally. This construction results in an open foundation that is said to be able to support more weight than most other forms of structural steel without creating circulation obstructions.

Question

Somebody told the boss that thinner stickers will cut down our kiln drying time and he wants me to plane all our stickers down to ½". What is the advantage in using thinner stickers?

Answer

There is a growing trend toward the use of thinner stickers, based upon the theory that thinner stickers and reducing spaces between board courses has the effect of increasing air velocity through the courses to speed up the drying rate. Some reduction in total air delivery has been reported from increased friction losses but over-all results indicate this to be a sound practice when intelligently applied.

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and

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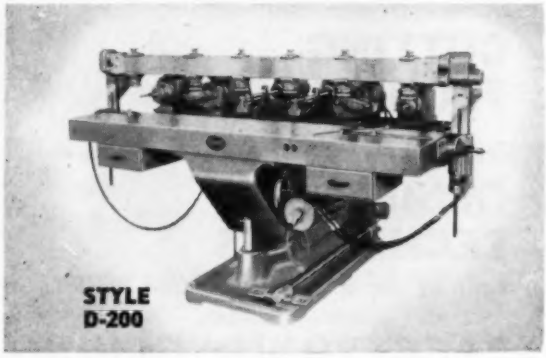

All types of edge, end and face boring in wood assembly parts are accomplished with a high degree of accuracy over long runs. Root's Model D-200 can provide the answer to all types of dowel and screw hole boring. Hydraulic spindle feed, geared-head individually motorized spindles, and automatic adjustable work clamps are a few of the features of this widely used machine. Write for bulletin.

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YORK, PENNSYLVANIA, U. S. A.

New Literature

STEAM SAVERS

A bulletin describing new economies in steam operations with the Wilco-Stansbury "Steam Saver" is announced by the manufacturer, Wilco Machine Works, 1301 N. Hollywood, Memphis, Tennessee. A completely closed hot condensate system, the unit has demonstrated proven economies in fuel and steam consumption and improved capacity in veneer dryers, elimination of "cold corners" in hot plate presses, and shorter cycles in rendering and other cookers.

HOW TO CUT COSTS

Of interest to all users of kiln-dried hardwood parts is a booklet entitled

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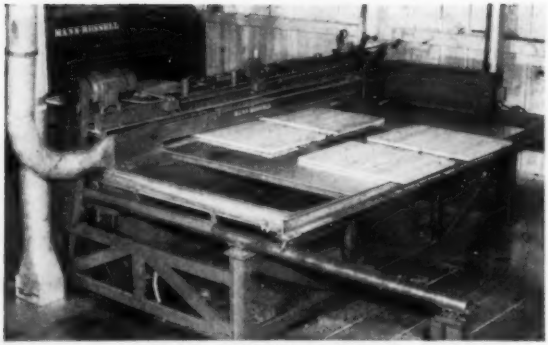

Installation: Biles-Coleman Lumber Co., Inc., Omak, Wash.

"EDGE-GLUED OUTPUT MORE THAN DOUBLED, glue costs down several hundred dollars per month," writes user of this Mann-Russell Electronic Continuous Lumber Edge-Gluer. The off-bearing cut-off saw table, shown here, comes complete with automatic, adjustable cut-off saw. Unit will edge-glue hard or soft wood stock in seconds; the saw then cuts stock to any desired panel width automatically, without interrupting continuous flow of material. Glue-lines are solid set, with no scorched surfaces; stock is ready for immediate use. Units like this are engineered to meet specific needs; installed and serviced by factory specialists as a single-responsibility package. Write MANN-RUSSELL ELECTRONICS, 2156 Pacific Avenue, Tacoma 2, Wash.

"How to Cut Your Costs with Kiln-Dried Hardwood Dimension" released by the Hardwood Dimension Manufacturers Association, 218 Broadway, Nashville, Tennessee.

This colorful booklet tells both in text and picture form how the cost conscious executive during this highly competitive period, can cut his costs and at the same time produce a better product by turning to the hardwood dimension manufacturer for his hardwood parts requirements.

Among the cost reducing factors outlined in the booklet which warrant consideration by the prospective user of purchased kiln-dried hardwood dimension parts are: (1) reduced unit transportation costs, (2) reduced materials inventory, (3) less investment in machinery and equipment, (4) reduced ground and floor space, (5) lower overhead expenses, (6) definite raw material cost, (7) waste disposal problems simplified, (8) proximity of dimension to vast timber and lumber supplies.

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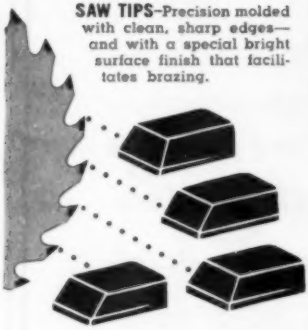

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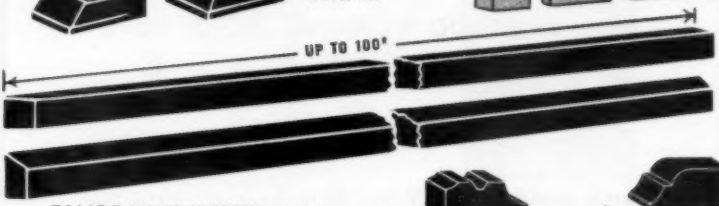

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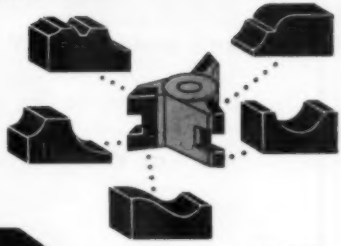

Metal Carbides Corporation, Youngstown 7, Ohio.

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The booklet gives an educational tour of an industry which is equipped to supply kiln-dried hardwood dimension parts efficiently, to all users of hardwood parts for assembly into their finished product. Among the present successful and satisfied users of purchased hardwood parts are: manufacturers of furniture; radio, television, phonograph, and sewing machine cabinets; advertising displays; office desks and equipment; form equipment; wood parts for assembly into machinery and equipment; brushes; wood toys; lumber core plywood; building contractors; architects and other users of interior trim and molding, stair treads and risers, wall paneling, etc.

GOVERNMENT SPECIFICATIONS

Publication of the U. S. Government Specifications Directory, the first com-

In addition to the booklets and pamphlets reviewed here in the New Literature Section, you will find other helpful brochures, etc., offered by WOOD WORKING DIGEST advertisers on page 193. This literature will provide you with information about machines and materials. Write directly to the manufacturer, or to the Readers' Service Department of WOOD WORKING DIGEST.

plete guide to reference sources of the specifications and standards used by the government in its purchasing, is now available.

The directory discusses in detail the purchasing specifications used by the military and civilian agencies of the Government, and appropriate indexes to them; tells how the businessman may obtain copies of particular specifications or specifications indexes for continuing use; lists more than 500 government activities or depository libraries for government publications where specifications and indexes to them are available for reference purposes, and gives other helpful information.

A major portion of the directory is devoted to the listing of the many points, in or near their own communities, where small business owners may locate quickly specifications and indexes needed in deciding whether to bid on Government purchases or in preparing bids.

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WHAT IS THE NAM?

A new booklet answers this question. The pamphlet includes information on the broad philosophy underlying all NAM policies and on industry's views on such specific subjects as our patent system, the conservation of America's resources, competition, employer-employee relations, the need for curbing Federal government spending, tax reduction, greater state and local responsibility, profits, foreign trade and education.

The booklet tells how policies are formed and for whom the NAM speaks. Copies are available from the National Association of Manufacturers, 2 East 48 St., New York, N.Y.

The average girl needs more beauty than brains because the average man can see better than he can think.

TAILOR-MADE CONVEYOR UNITS

The W. F. & John Barnes Company, 369 South Water Street, Rockford, Illinois, announces the release of a new brochure entitled, "Practical-Engineered Conveyor Units and Systems." This new, attractive two-color brochure pictures and briefly describes how 27 material handling problems were solved with Barnes mechanized units. Each, an automation unit in itself, is individually designed and built from standard components to meet the needs of the particular job.

This brochure shows the range and variety of "tailor-made" conveyors built by Barnes during recent years for wood products, metal-working, food, drug and other similar industries.

DECORATIVE PLYWOODS

"Modern Magic", a 12-page 4-color booklet on decorative plywoods, has been released by Associated Plywood Mills. Inc., Eugene, Oregon.

Full color photographs of home interiors in traditional and contemporary settings, depict the use of Associated's "Sea Swirl" and knotty "Sea Swirl" decorative fir plywoods, and veneer faced plywoods in birch, knotty pine and Philippine mahogany.

With plywood plants at Eugene and Willamina, Associated originated its brushed plywood "Sea Swirl" four years ago. The popularity of this and other specialty products has resulted in special manufacturing facilities and the company reports a steadily increasing trend in decorative panels for new building and for modernization.

BETTER UTILIZATION

Conserving our forest resources at their point of origin and increasing the utilization of wood by developing a "conservation consciousness" in the consumer is the purpose of three consumer leaflets and one retail by the California Redwood Association, 576 Sacramento St., San Francisco. Urging the use of the lowest grades and shortest lengths of lumber in order to utilize more of the tree and extend the life of old-growth timber is the theme of the leaflets which are being distributed through redwood mills to retailers in the larger cities of the country. In doing this, there will be more volume sales to the retailer, more savings to the consumer, and better conservation of our forest lands.

To the consumer, the leaflets deftly point out that the shorter lengths and lower grades are better suited to some jobs than the long, clear lumber, and at the same time are a fraction of the cost. The common grades of redwood have many of the same desirable properties as the upper grades. At the same time, "No. 1 Shop" redwood is available in standard lumber widths and thicknesses, yet is much less expensive than long pieces of redwood. And by planning every piece of wood can be used.

DEALER TRAINING PROGRAM

To better acquaint eastern dealers with features of the woodworking, metalworking and Homecraft lines of Delta power tools, a comprehensive educational-sales training program has beeen started at the Brooklyn, N.Y. plant of Rockwell Manufacturing Company's Delta Power Tool Division.

The course, running from Monday through Thursday every week, will accommodate 15 to 20 dealer and jobber salesmen a week, and is under the direction of George Rockwell, eastern division sales manager.

The purpose of the course, Mr. Rockwell explains, is to show the salesmen attending the course how to go out and really sell. He is sure that confidence through product knowledge is the best incentive for more activity from any salesman.

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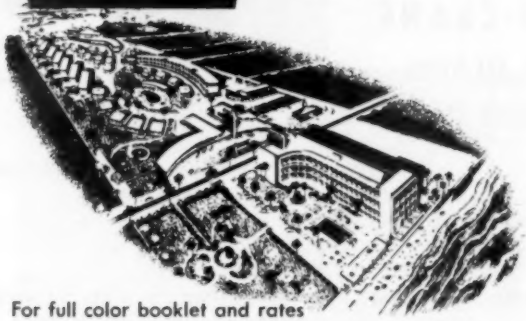
650 Accommodations each with private terrace. Hotel, Motel, Apartments and Villas. 20 acres of resort pleasure from the Atlantic to Biscayne Bay.



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JOHN M. DUFF, Jr.
General Manager

ON THE OCEAN AT 194th STREET, MIAMI BEACH
FLORIDA

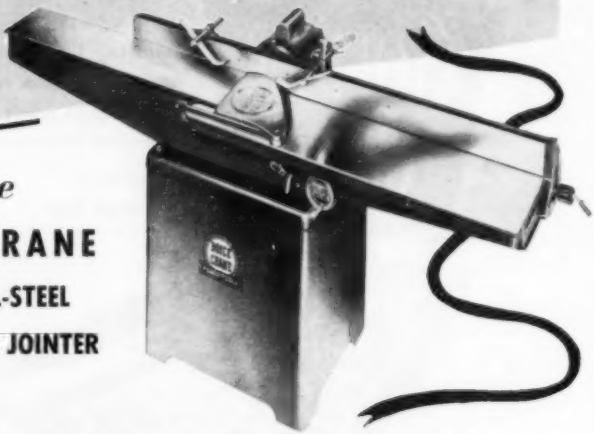
CONTINUOUS MOISTURE DETECTOR

A 6-page folder has been released by Laucks Sentry Products, 1108 Western Ave., Seattle, Wash. The Laucks sentry was originally designed for use in plywood, veneer and furniture. Since then, however, the application has been broadened to include almost every phase of woodworking.

Two series of the Sentry are available: series "A" for lumber, furniture, core and dimension stock. Series "B" is for plywood and veneer. Series "A" is readily installed at the unstacker, jointer or planer where there is a continuous flow of material. Four models are available in this series.

Series "B" Sentries can be installed at the grading or sorting table or other similar location. This Sentry offers 100% inspection of every square inch of veneer. The brochure illustrates and describes the various uses of both series and all models.

For more perfect work with a saving of time and labor...



The

BOICE-CRANE

8-inch ALL-STEEL

LONG TABLE JOINTER

The 84" full length undergirded steel table (3 times stronger and 2 to 3 times stiffer than cast-iron) and 66" x 4" fence easily handle stock up to more than ten feet long. Make it unnecesary to rig up awkward extension brackets and clumsy feeding aids as with shorter jointers. Planes boards and panels up to 16" wide.

STRENGTH, PERMANENT ACCURACY AND ALIGNMENT

impossible with bolted-up cast-iron construction.

Entire infeed table is a rabbet arm, adequately supporting narrow rabbeting on wide stock. When rabbeting, the guard stays on the machine—simply turns and swings out of the way—a Boice-Crane exclusive.

Tables are simultaneously ground flat—parallel to closest limits—stay flat permanently. The only long table jointers with full-length, front-adjusting, double-locked fences.

Quick, positive, micrometer-accurate knife setting. All knives cut the exact same depth within .002" to .003" for a perfect finish, without chattermarks. Smooth operation. 3¼-inch dia. head. Improved cutting angle. Depth of cut, ⅝". Cutting arc dia. 3⅜". Speeds up to 5500 r.p.m. save you time.

Rotor-on-cutterhead or V-belt drive optional.

Boice-Crane also manufactures 6"x60" steel and 6"x36" cast-iron jointers.

Available now through industrial supply distributors.

Send coupon today for free catalog.

BOICE-CRANE COMPANY

931 CENTRAL AVENUE **TOLEDO 6, OHIO**

Please send Big Free Boice-Crane Power Tool Catalog.

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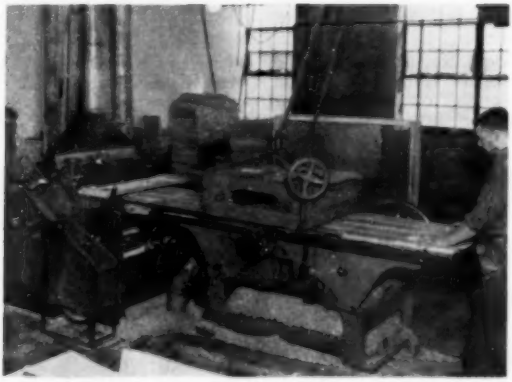
EQUIPMENT and Supplies for the WOODWORKING INDUSTRY

BILLSTROM POWER FEEDER

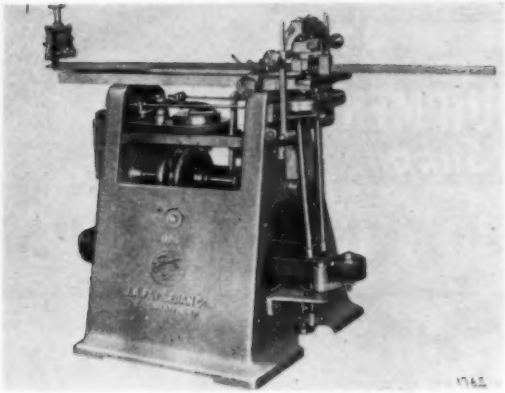


All woodworkers know that rough stock must first be brought to a level surface to secure good work. The old practice was to push it over the jointer by hand power. Now, however, there is an inexpensive attachment for use on the hand jointer which solves this problem. The makers claim it will face crooked and winding stock absolutely straight because it does not press the stock down out of line on the front table but carries it along in its natural position so that only the irregularities are removed.

The attachment works on any make or size of hand jointer. Picture shows a feeder in tandem with a thicknessing planer, where two operations are done as one. The feeder is available from Nels J. Bilstrom, Inc., Rockford, Ill.

BLIND STYLE MORTISER AND BORER

A new improved ball bearing automatic blind stile mortiser and borer has just been announced by the J. A. Fay & Egan Company. The machine is one of the new "900" series line currently



being introduced by the Cincinnati, Ohio, manufacturer.

The new model No. 924 is designed for boring holes for rolling blinds and making the mortise for the stationary slats, in inside or outside blinds, for doors or windows. It is fully automatic in operation. The operator merely puts in the stiles and starts the machine.

The stiles are held rigidly while bored or mortised and, by combination in the feeding mechanism, are released as they are fed forward and again clamped tightly. Due to the modern design of the model No. 924, all holes and mortises are left free of shavings.

The new Fay & Egan machine will efficiently bore 90 pairs of holes or mortise 24 pairs of blind stiles per minute. It can mortise from round hole to 2¼" in length up to ⅝" deep and at any angle up to 45 degrees.

Depth of mortise is easily regulated by adjustment of spindles. Spacing of holes or mortises is regulated by toothed spacing bars. A steel feeding rack, spaced perfectly true, insures accurate work. The machine has a capacity for stock as small as ⅝" x ⅝" or as large as 2" wide x 6" high.

WATER WASH SPRAY BOOTH

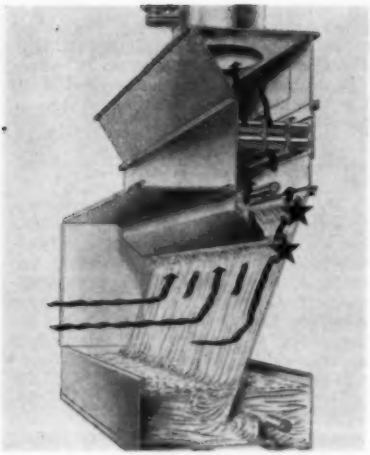
One of the most recent developments of the Binks Manufacturing Company, 3122 Carroll Ave., Chicago, Ill., is a water wash spray painting booth designed for economical use in normal industrial production. It has been typed as the style "D" booth.

According to the manufacturer, this booth meets the requirements of fire, health and state authorities.

This new booth supplements the type Duc high production water wash spray booth introduced by Binks sometime ago. The "D" booth is not designed to compete with the extremely high efficiency of the Duc booth. The style "D" booth will find its greatest acceptance in those plants which require a good, low-cost, approved exhaust system for general use.

Overspray and fumes from painting operations are drawn through two separate, thorough washing operations. Velocity of the air passing through the wash chamber never exceeds 600 f.p.m. and, as a result, utilizes the full efficiency of the water action. This scrubs the atomized paint pigment and vehicle from the air and deposits them in the collecting pan below.

The cleaned air then passes through a series of staggered arrestor plates



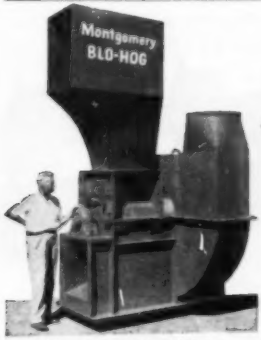
which remove free moisture before the air is exhausted to the outside. Stacks and fans stay cleaner longer. Fire hazard is greatly reduced.

The circulating pump forces water from the collecting pan through a special manifold which sprays it in two directions in an unbroken curtain. Excess water passes the manifold and returns to the collecting pan. This continuous circulation flushes the manifold and eliminates clogging. Once the booth is in operation no water is required except to replace that lost through evaporation . . . a small fraction of 1%.

MITRE SAW MAKES TWO CUTS

This new mitre saw makes two simultaneous cuts—saving over 50% in time and labor. Continuous operation is assured because work is not removed for separate cutting. This powerful, extremely versatile tool is specially designed for all mitred work such as picture frames, window and door frames, moldings, etc.

Angle of cut is variable to compensate for various hardnesses of wood and allowing inside of corners to close first.



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Write for bulletin and details

JACKSONVILLE BLOW PIPE CO.

Jacksonville, Florida

P. O. Box 3687

The Marvelous Montgomery

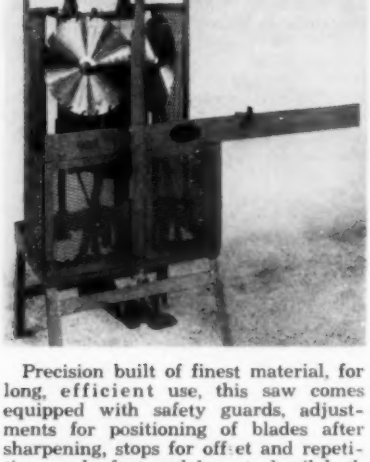
BLO-HOG (The only all-purpose hog in the world) Patents Pending

EATS UP EVERYTHING

. . . including Pine, Oak, Gum, Hickory, Elm, Cedar, Wet Veneer and Sandy Bark. Conveyor-fed — no attendant required. Positively protected from major damage by tramp steel. All connections locked — nothing to shake loose. Maintenance costs unbelievably low.

". . . Dear Mr. Montgomery: It is an unbelievable machine and it is still hard to believe that it is actually handling the enormous volume of scrap we are feeding into it. We operate the hog without an attendant—which means a considerable saving." — J. B. BLACK, Ocala Mfg. Co., Ocala, Fla.

Sumner Iron Works, Everett, Washington, W. Coast Rep.
Canadian Sumner Iron Works, Ltd., Vancouver, B.C., Canadian Rep.



Precision built of finest material, for long, efficient use, this saw comes equipped with safety guards, adjustments for positioning of blades after sharpening, stops for offset and repetitive work, foot pedal control, oil bath gears and precision bearings, plus many other special features. Equipped with 1½ h.p. motor, 1800 r.p.m. on 16" saws.

Manufactured by Glasco Equipment Corporation, 8 Wait Street, Paterson, New Jersey.

SHUTTER SLAT TENONER

The re-birth of the shutter industry, specifically indoor movable shutters, has created a demand for modern production equipment. To answer this demand, the Century Tool and Engineering Company, 6336 W. Slauson Avenue, Culver City, California, has developed a complete line of modern automatic and semi-automatic machinery.

The most important piece of this equipment is an automatic shutter slat tenoner. This machine is completely automatic requiring the operator to do nothing more than load the slat stock and turn the machine on. The automatic cycling of the machine is accomplished

Increase CUT-OFF SAW Production

WITH A

COMET

ADJUSTABLE STOP GAUGE!

COMET Stop Gauges are faster because: Stops can be positioned anywhere on the bar by hand. Additional stops can be added to the bar without dismounting it. Balanced stop trigger swings easily out of way when not in use.

COMET Stop Gauges are more accurate because: Cold rolled steel bar is engraved in ⅛" steps and can not be marred by stop clamps. Machined stop trigger is set to mark—no guess-work on rough stop castings. Work forees stop trigger against block (not away) for perfect alignment.

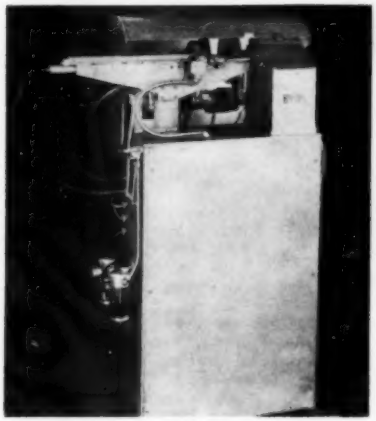
COMET Adjustable Stop Gauges are available in lengths from 8 to 20 ft. All parts are heavily plated against corrosion. Can be used on right or left hand installations. Price of 8 ft. bar with four stops: $36.00. F.O.B. Los Angeles.

Write for complete details to Dept. H-4.

CONSOLIDATED

MACHINERY & SUPPLY CO., Ltd.

2033 Santa Fe Avenue, Los Angeles 21, Calif.



by electrically synchronized air power with individual high-speed motors driving the cutter-heads. The machine is easily adjusted to vary both length of slat and diameter of tenon.

INSTANT STRIPPER

Something new and radically different from old type removers or strippers has been developed in the laboratories of the V. J. Dolan Company, 1830 N. Laramie Ave., Chicago 39, Illinois.

Their new stripper, being marketed under the name of "Instant Stripper", may be applied by dip, flow-coat, brush or spray. It has been formulated to remove, almost instantaneously, most baked or air-dried enamels, lacquers, synthetics, paints, varnishes, wrinkled, hammered or specialty finishes. It is non-flammable and only mildly toxic and can be used on both wood and metal.

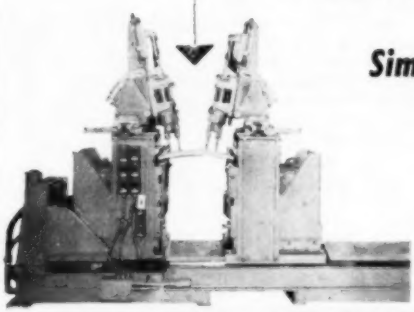
CRESCENT "HIGH NECK" BAND SAW

To fill the need for an even heavier constructed, larger under guide capacity 36" band saw than their standard model, the Enterprise company of Columbiana, Ohio, have reinstated their

MARION lets you...

DOVETAIL and BORE in ONE

Simultaneous Operation



This machine fills a long felt need for a practical double end Dovetailer that will bore the holes for drawer pulls at the same time on all types of drawer parts.

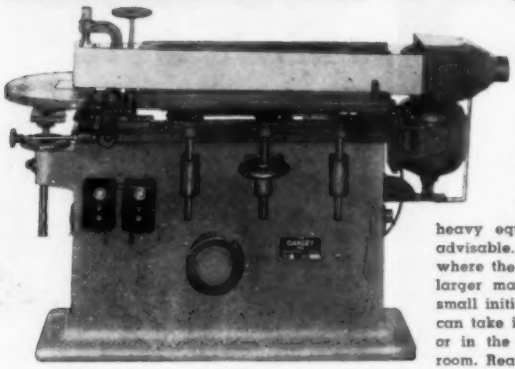
The MARION Dovetailer and Borer means greater production and lower cost.

For further information write Dept. BB

MARION MACHINE COMPANY

MARION, NORTH CAROLINA

The OAKLEY H-6 LIGHT DUTY SANDER

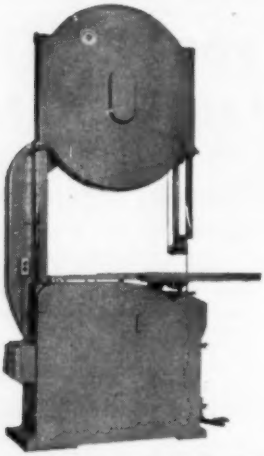


OSCILLATING AND NON-OSCILLATING MODELS

Here's a light-duty yet sturdily built Edge Sander designed for plants where floor space is at a premium and where heavy equipment expenditures are not advisable. Also in those departments where the size of stock does not require larger machines. With a comparatively small initial investment, the H-6 or H-6A can take its place in the production line or in the cabinet, pattern or assembly room. Reasonably priced. Write today.

Made in 2 models. H6 is the oscillating type and the H-6A which is non-oscillating. The latter machine is recommended for those plants where the oscillation of the sand belt is not required. Both models are reasonably priced. Send for full specifications and information.

THE OAKLEY COMPANY
BRISTOL • TENNESSEE



Crescent "High Neck" model 36" band saw.

The general appearance of the saw is identical to their standard machine. The specifications that differ are as follows: maximum capacity under guide, 23"; size of table, 29 x 36"; table tilt to left, 10 deg.; vertical adj. of upper wheel, 7"; blade length, 20' 8½"; shipping wt., 2450 lb.

The saw is available with direct motor drives, Vee-belt drives, and variable speed drives. On the variable speed drives a wide range of speeds can be obtained. Many electrical modifications, including J. I. C. standards, are also readily available.

FLEXIBLE SHAFT SANDER

Here is a new lightweight flexible shaft sanding machine made by the Stow Manufacturing Company, 129 Shear St., Binghamton, New York. This model, No. J-38, is mounted on a pan base with three casters.

Conrad Industries, Inc. of Morgan City, Louisiana, are using this machine with a 12' flexible shaft to sand the

wooden sides and hulls of the shrimp trawlers they make. By using this machine they eliminated much of the fatigue to the operator that was experienced with heavy sanders. For this job they used a ½ h.p. motor running at 3,500 r.p.m., an angle head, and a 7" sanding disc.

This machine can also be used for drilling, grinding, buffing, wire brushing, and polishing. It is available with ¼, 1/3 or ½ h.p. motors running at either 1725 or 3450 r.p.m. Standard flexible shafts are 5' or 6' long, but longer lengths can be obtained upon request.

CATALYST SPRAY GUN

A completely new field of spray finishing is expected to be opened with the marketing of a catalyst spray gun. The gun is manufactured by the DeVilbiss Company, 300 Phillips Ave., Toledo 1, Ohio.

Designed to simultaneously spray plastic resin and catalyst, the new DeVilbiss gun is claimed to be the only one made which will assure a uniform mixture of resin and catalyst.

Before the advent of the new gun, the common practice was to mix catalyst and resin together in small quantities, speeding application before setting

FAMOWOOD
...the AMAZING

ALL-PURPOSE PLASTIC for wood finishes!
. . . applies like putty — sticks like glue!

FAMOWOOD is the answer . . . where wood finishes are important. Simple to use . . . efficient, lasting, time-saving, when filling wood cracks, gouges, nail and screw holes or correcting defects. Dries quickly, does not shrink. *Stays put* under adverse conditions. FAMOWOOD sands easily, does not gum up sander. Takes spirit dye stains freely. Waterproof and weather-proof when properly applied. Ready to use — "*right out of the can.*" Fifteen matching wood colors . . . with amazing matchless wood finishes.

USED BY . . . Furniture Mfgs. • Sash and Door Mfgs. Cabinet Makers • Contractors • Boat Builders • Painters Aircraft Plants • Pattern Shops • Home Builders All Wood Products

FAMOWOOD descriptive literature and price list on request. Distributor and Dealer inquiries invited, write Dept. 111

BEVERLY MANUFACTURING COMPANY 9118 SOUTH MAIN STREET LOS ANGELES 3, CALIF.

MANUFACTURERS OF FAMOWOOD • FAMOGLAZE • FAMOSOLVENT

action took place in the spray gun fluid cup or in the gun.

This method is slow and also time consuming. With the new DeVilbiss gun, the resin is fed to the gun through the fluid line and the catalyst is introduced through the air stream. The gun has but one head. When the gun trigger is actuated, catalyst and resin meet outside of the air cap and are atomized uniformly so the correct amount is applied to the surface being sprayed.

To assure a uniform mixture, DeVilbiss engineers have installed a single pressure control for the resin and a double pressure control for the catalyst which is the governing agent in setting the resin. Dual atomizing air pressure control is also provided to insure uniform results regardless of main line pressure variation.

EXTRA DEEP CLAMPS

Latest addition to the B & C line of maintenance and production tools is a deep-throated clamp made of ductile iron, recently developed by the International Nickel Company.

Ideally suited for those jobs where a deep reach in clamping is required, B & C extra-deep clamps are stronger than malleable iron. Tensile strength is 90,000 p.s.i., and yield strength is 75,000 p.s.i.

The clamp screws have standard Acme threads for rapid adjustment, and are fitted with rocking swivel pads and sliding, vise-type handles for ease of operation.

B & C extra deep clamps are available in 4", 5", and 6" capacities. For further information inquire from Brink & Cotton Mfg. Co., 111 Poland St., Bridgeport, Conn.

JET COUNTERSINK

A new "Jet" combination countersink and counterbore is now available. This multi-purpose tool is practically indestructible and suitable for high production in portable drills, drill presses or multiple boring machines. These tools are furnished for use with 1/8", 5/32", 3/16", 7/32" & 1/4" drills, and for flat or round head screws. The stop collar, 1/2" I.D., regulates depth of pilot hole, countersink or counterbore. Literature and tools are available through W. W. Drilsaw Co., 1561 Virginia Ave., Glendale 2, Calif.

PORTABLE AIR HEATER

A new portable air heater that can be converted from electric motor to gasoline engine power in minutes is now on the market. A special conversion kit allows the electric motor to be replaced with a gasoline engine, and vice versa, whenever the operator wishes to change the type of prime mover.

This new heater, called the Herman Nelson Utility Model, is particularly well suited to lumber storage, according

HARRY-
A NEW ITEM WITH PLANETOR... BUT THE SHOP SAYS THEIR MACHINE BITS ARE THE BEST!
LET'S TRY 'EM
Pete

PLANETOR COUNTER BORES

Shops that have used Planetor machine bits need only be told that here are counter bores with the same exclusive chip-flow principle . . . and precision-made of the same highest quality steel. Newcomers are invited to use—and to compare—Planetors (machine, portable or counter bore) with any other bit on the market today!

Fit any ½" shank—choice of mountings, as illustrated.

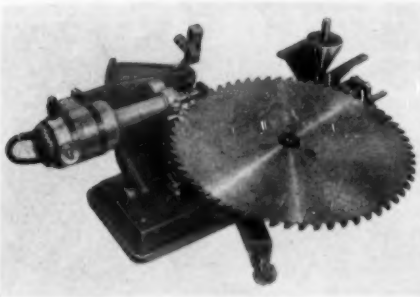
Stock sizes from 1⅜" to 4½"; larger sizes on special order.

• *Available at your tool dealer—or write for information*

PRICE & RUTZEBECK
P. O. Box 30, Hayward, California

THE RIGHT TOOLS FOR THE JOB
PR
TOOL

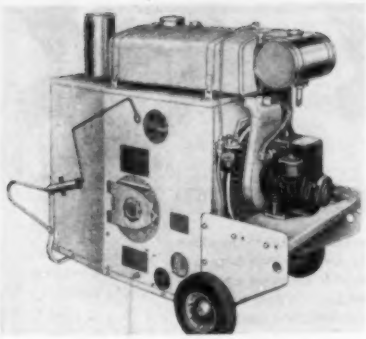
SHARPEN *YOUR OWN* SAWS



Pat. No. 435,691 June 10, 1954
Will grind both face and tops of teeth. Screw adjustments make for easy, trouble-free, fool-proof operation . . . even by inexperienced men!

Now you can sharpen your own saws . . . faster, more efficiently and more economically, too! The new Huther 142 Carbide Saw Grinder enables you to eliminate the inconvenience of delays and the expense of down time. If you have three or more carbide saws, this machine will pay for itself in a hurry. And if you operate a medium or large shop, you simply cannot afford to be without the new Huther 142 Grinder . . . which will sharpen any saw from 6" to 24" in diameter. Low in price, economical to operate, easy to use and dependable. Write today for full details.

Write today for CATALOG CT 100
HUTHER BROS. SAW MFG. CO., INC.
1290 UNIVERSITY AVE. ROCHESTER 7, N.Y.



to R. C. Koehring, Portable Heater Sales Manager for the Herman Nelson Division of American Air Filter Company, Inc., Moline, Illinois. It can be used just as effectively in buildings without electricity as in buildings with it. It is optionally oil-fired or gasoline-fired, yet is completely safe with fumes vented outside the work area. It may be operated indoors without danger from fire.

From 75,000 to 425,000 BTU of clean heated air can be supplied by the heater. Being an entirely self-contained unit, its operation is simple, with no ignition electrodes, transformers or relays. Heat output may be regulated, and the large capacity fuel tank allows overnight operation without refueling.

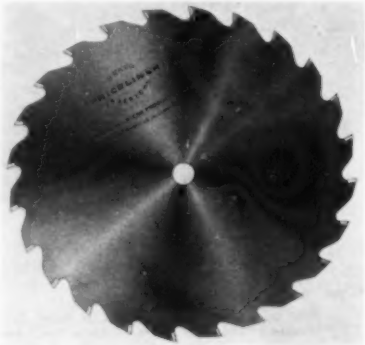
ARROW HAMMER TACKER

Designed and balanced to give accuracy and power, the Arrow HT-50 automatic hammer tacker, manufactured by the Arrow Fastener Co., Inc., 1-5 Junius St., Brooklyn 12, N.Y., is used like a hammer. Simply operated with only one hand, the HT-50 weighs 2½ lb. and is 11¼" long. It is accurately balanced.

The HT-50 will take three leg sizes of staples: ¼", ⅜" and ½". It is easy to load or to switch from one size staple to another. It automatically drives a staple wherever a nail can be driven and is used for light or heavy duty stapling jobs. The tacker is streamline, constructed of heavy steel with hardened steel working parts and a shatterproof handle.

NEW SAW BLADE

The North American "Priceliner" is an entirely new line of low-cost, carbide tipped saw blades offered by the manufacturer of the well known North American "Woodsman" carbide tipped blades. This new blade of chrome-nickel alloy steel bodies is finely-fitted with diamond ground tips in two styles. The "Variety" for cross-cutting and ripping with the feature of alternating scoring teeth followed by a raker tooth in each section and the heavy-duty "Rip" with the full-throated gullet and strong tooth design for fast and deep cutting.



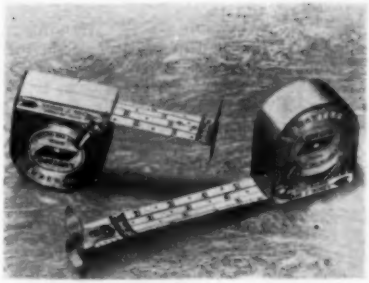
On-the-job test reports prove the new saw to perform well on soft and hardwoods, plastics, and non-grained materials, taking self-feed ripping and cross-cutting operations with easy-

action. The full clearance grind has proven to stand up hundreds of hours on hardwood without burning and little or no pitch buildup. They are stocked for immediate delivery, from North American Products Corp., Box 210, Center Grove Road, Edwardsville, Ill.

MEASURING DEVICE

Called the Lumtape, here is a lumber measuring device that can be carried in the pocket, instantly available at all times. It is easily adaptable for on-the-spot measurements.

Measuring with the Lumtape is a convenient one-hand operation because: (1) its handy size fits the hand as neatly as the pocket; (2) its blade pulls instantly in and out to accommodate any required width; (3) a thumb-lock holds the blade firmly extended as long as necessary. And no time-consuming arithmetic must be done to convert board-feet because the rule reads directly.



With big, clear, black-on-white numbers, the rule is calibrated for even or odd lengths up to 16 board feet. Tipped by a mansize hook, the blade can be extended a full 10 feet.

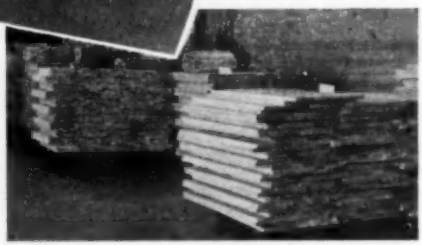
The rule is available from the Lumtape Corporation, P.O. Box 614, Hillside, N.J.

It is good to rub and polish your minds against the minds of others.

To Manufacturers of *Fine Furniture*

Quality manufacturers throughout the industry depend on Bradley for specifications in Southern species, fully machined, as well as cut-to-length, solid or glued, moulded and tenoned to pattern.

For your basic components in good furniture manufacture, nothing surpasses the hardwood timber, modern dimension plant and semi-finished products responsible for Bradley's recognized leadership as a supplier of superior



HARDWOOD
FURNITURE
DIMENSION

BRADLEY LUMBER COMPANY *of Arkansas*

WARREN, ARKANSAS

ELECTRIC MARKER

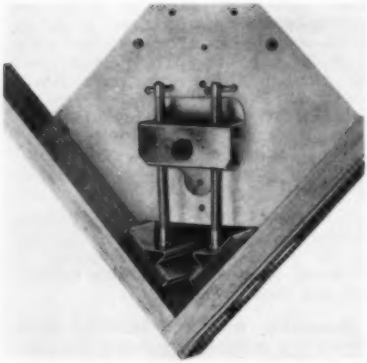
The patented "Burn-watt" electric marker produces a trademark in a great variety of wood items. In less than two seconds, a deep permanent trademark or name is produced, as easily as using a rubber stamp. The Burn-watt marker does away with decals, temporary labels, metal tags, etc.

Here are a few of the recommended uses: cabinets, barrels, tables, handles, chairs, hospital equipment, sports equipment, doors, novelties, lumber, crates and boxes, toys and furniture. Complete information about the tool is available from Burning Brand Electric Co., 4554 N. Broadway, Chicago, Ill.

CORNER CLAMP

A heavy duty corner clamp for general purpose work is a popular addition to the line of shop tools produced by the Gunver Manufacturing Company of Manchester, Conn. With a gripping capacity for materials ranging up to 4½" in width, the jumbo-sized clamp is said to provide firm clamping action of wood stock ranging from picture moldings up to 2" x 4".

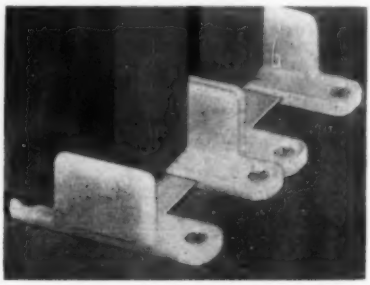
According to the manufacturer, the new clamp has several unique features.



Principal among these is a two-position screw block which makes it possible to adjust the clamp to accommodate stock up to 2⅜" wide in one position and maximum gripping capacity (4½") in the second. The screw block is fitted with two clamping screws which are easily adjusted, independently of one another. This feature makes it possible to firmly clamp, at right angles, materials of varying widths.

NYLON FLOOR GUIDES

Grant Pulley and Hardware Corporation, 31-85 Whitestone Parkway, Flushing 54, New York, announces the marketing of two new sliding door floor guides. These nylon floor guides are applicable to single and multiple door installations and can be adjusted to fit any conventional door thickness re-



quirements. "Elongated mounting holes," the manufacturer states, "permits fine adjustments even after doors are installed and operating."

Applicable to grooved door installation, as channel guide and in conjunction with guide strips, these universal guides combine the following features into one floor guide: self-lubricating nylon, adjustability, and no metal to metal contact.

CARBIDE TIPPED GUNS

Super-tough tungsten-carbide has found a new and novel use in the tips of putty gun nozzles.

A putty gun nozzle tipped with grade K-6 Kennametal tungsten-carbide, outlasts many conventional steel nozzles in applying putty under heavy air pressure, according to Kennametal, Inc., Latrobe, Pa.

Cited as an example of the durability of Kennametal in the tips of putty gun nozzles is the experience of two sash and door manufacturers who used Kennametal-tipped nozzles for one year, or approximately 2,080 hours. There were no signs of wear. The carbide nozzle tips are still perfect in form and orifice size.

NEW TOOL CUTS BOTH FLAT STRAP AND WIRE

Customer demand for a cutting tool which severs both flat strapping and round wire has resulted in the new No. 503 strap and wire cutter, developed and manufactured by A. J. Gerrard and Company, 1950 N. Hawthorne Ave., Melrose Park, Illinois.

Many cutting tools now on the market do a good cutting job on either of the two, but blades on both types of cutter soon become dull and inefficient if used for both strapping and wire.

A double duty set of cutting blades on the No. 503 cutter will handle flat

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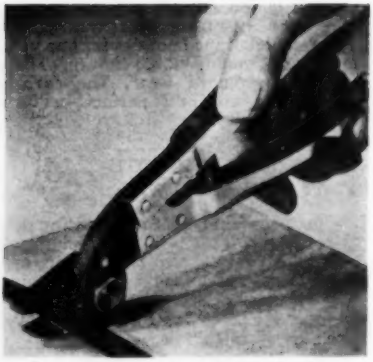


strapping at the mouth of the tool and round strapping in a second set of cutting surfaces near the rear of the cutter head. This easy to operate, lightweight tool will cut strap as heavy as ¾" x .035 or 12-gauge wire. The cutting blades can be resharpened.

TILTING GLIDES FOR FURNITURE

A new floor protection device designed especially for the thin legs characteristic of modern furniture has been announced by the Bassick Company, Bridgeport 2, Conn.

The new "Tilting Glides" are flexible to accommodate the popular splayed legs of current chairs, sofas and similar pieces. Their broad, flat base distributes the leg bearing load over an area 10 to 20 times larger than that of the leg itself.

With the investment in new flooring running over $300 million a year in urban areas alone, The Bassick Company points out, the need for protective devices to prevent marring and gouging

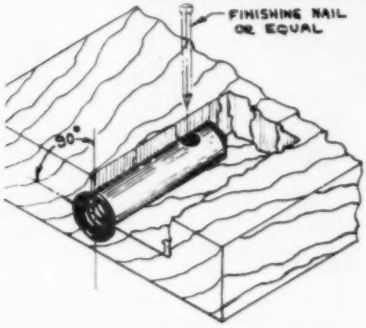
of floors is growing. The new Bassick "Tilting Glides" provide this much-needed protection, while at the same time, their modern lines compliment the design of today's furniture.

INSERT PROVIDES INTERNAL THREAD IN END GRAIN

Cross-cut ends of wood boards may now be provided with a ¾" length of internal machine-screw thread by the use of a new metal insert announced by the Southco Division of South Chester Corporation, Lester, Pa.

The Southco No. 70 tubular insert, held firmly in place by a finishing nail

driven through the board at right angles to the thread, overcomes the difficulties usually encountered by inserts in wood



end grain. The Southco tubular insert is simply pushed into a drilled hole 29/32" deep; the seam is lined up at 90° with the board surface, and a finishing nail is driven through the wood ¾" from the edge, transfixing the insert and preventing pull-out and torque slippage.

ELECTRIC HAMMERS

A 20-page "How-To-Do-It" book covering the uses of the company's line of portable electric hammers and hammer tools has been published by the Black & Decker Mfg. Co., Towson 4, Md. The book contains over 50 photographs showing the many applications for the tools, plus easy-to-understand charts showing relative penetrations of B & D hammers vs. hand operation with the same size drills.

Cutaway and exploded views of a Black & Decker hammer are included which graphically shown the principle of operation and inner works of the tool. The book contains a large cross-index chart listing the major applications of Black & Decker hammers and the varied fields of industry that can use them.

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$9.90 Postpaid

3 WING CARBIDE TIPPED SHAPER CUTTERS

at an amazing low price!

FOR WOOD • PLASTICS • ALUMINUM

Ruba precision cutters can be used on shaper or drill press . . . for the most specialized job. They last longer, keep edges longer and save resharpening costs.

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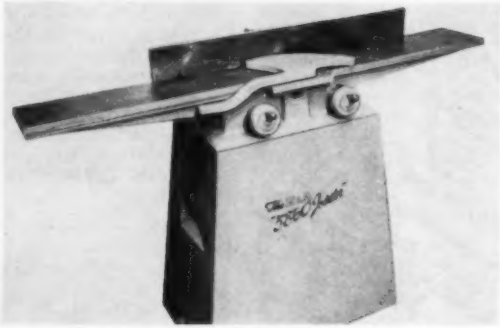
HESTON & ANDERSON JOINTER



Carrying on its program of modern designing, Heston & Anderson, Fairfield, Iowa, has announced that its new "5860" 6" jointer is ready for distribution.

The big table, 60" over-all, and fence, which is 37"x4", now rests on a sturdy tapered stand. Larger hand wheels with of each table, are handily located at turning knobs, controlling the setting the front of the jointer.

A balanced three-knife head, 2⅞" diameter, operates at 6,000 r.p.m., 18,000 cuts. Only heavy duty, dust-proof life-sealed bearings are used. Babetting capacity is ⅝", with a rabbetting arm support 8½", extending 3" from the bed.

NEW LINE OF KNIFE GRINDERS

The Dependable Machine Company of Greensboro, N.C., announces the development of a new line of low cost hydraulic knife grinders. The Hydro-Travl type NN grinders, as they are called, will sharpen any straight edged cutter with precision whether the knives and blades are made of high speed steel, carbon steel, carbide, or laid (tipped) high speed. They are de-

signed to sharpen knives for moulders, planers, chippers, barkers, veneer lathes, hogs or any straight edge or face either straight, bevel or hollow grind.

The Hydro-Travl grinders have the following features: inverted "V" ways which are self-adjusting to take up wear; three speed precision spindle Vee belt drive or direct motor drive, simple hydraulic drive—no gears to wear out; all controls conveniently located in front of the machine; quick method to shorten stroke of knife carriage—even when machine is in operation, knife carriage can be stopped immediately for checking knives—without stopping machine; one knife plate gives both standard and upside down grinding; quick adjustment of grinding head unit for doing straight or hollow grinding; variable speed for travel of carriage; adjustable cross-feed; various types of grinding wheels and wet grinding attachment.

Two models of these knife grinders are being built at the present time. They are the Hydro-Travl NN 320 (32") and the Hydro-Travl 480 (48"). According to the manufacturer, the development of this new machine is another step forward in the company's policy of development of new products with features revolutionary to the woodworking machinery field.

BLACK & DECKER UTILITY SAWS

The Black & Decker utility 7", 8" and 9" heavy duty saws for 1954 have been completely redesigned to facilitate operation and speed accurate sawing.

Among the features of B & D's new heavy duty saws are: an exclusive saw grip handle, placed at natural sawing position; a king-size lever arm for retracting the lower blade guard for making pocket cuts; heavy duty Universal motors designed specifically for power sawing; and improved cutting line and blade visibility.

Other features include a large, sturdy shoe for good support and easy right

or left-handed operation; full adjustment for depth or angle of cut; instant release trigger switch and telescoping lower blade guard for safe operation, and an auxiliary knob on the front of the saw for two-handed operation when desired. The power cable on the new saws passes out the end of the handle to eliminate interference with the operator or work material, says the manufacturer, Black & Decker, Towson, Md.

The saws have two depth adjustments, front and rear, permitting the handle to be kept at a comfortable position even in very shallow cuts. Extra large, sturdy wing nuts are used on all models for quick and accurate setting of depth and bevel adjustments. The 7" and 8" models can be set at 0" depth of cut, while the 9" model has a minimum cutting depth of ¼", permitting each model to be used for all normal building operations.

Maximum depth of cut for the 7" saw is 2 7/16"; for the 8" saw, 2 13/16", and for the 9" saw is 3¼". At 45° bevel, maximum depth of cut for the 7" saw is 1¾"; for the 8" saw, 2 1/16", and for the 9" saw, 2⅜". No-load speeds for the three new saws are 4,200 r.p.m., 4,500 r.p.m. and 3,700 r.p.m. for the 7", 8" and 9" models respectively.

A new 6" heavy duty adjustable saw rounds out the 1954 Black & Decker utility saw line.

WOODY'S QUIZ....

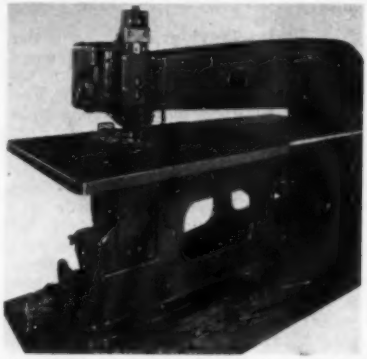
In loggers' lingo a "barber chair" is a stump with slivered wood sticking up from the edge of the undercut.

With modern power saws loggers cut trees close to the ground. Lower stumps mean longer logs—more wood for the mill. This adds up to greater prosperity for woods and mill workers and the 60,000 communities where they live. Let's all help Keep America Green.

A Tree Farm is private forest land growing repeated timber crops for use

RAIMANN MACHINES

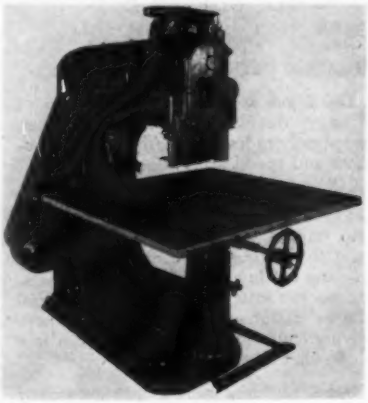
The Raimann knot boring anl plugging machine, and the Raimann veneer patching machine are both being



Automatic knot boring and plugging machine

handled by the E. V. Prentice Company, 2303 N. Randolph St., Portland 22, Oregon.

The operation of the Raimann knot boring and plugging machine requires a few seconds and is completed in one single automatic action by the touch of a foot pedal. A bit bores out knots—retracts automatically; blower removes



Veneer patching machine.

chip; glue is sprayed on side and bottom of hole by injector. Carriage moves—plug is cut from lathe in magazine and driven in hole.

The veneer patching machine operates on the same principle with an automatic foot pedal operation. Other units in the Raimann line include automatic, high capacity, single or double, gang edging or ripping and grooving saws vertical high speed 44"x56" band resaws and automatic multiple cutoff saw with hopper feed.

ELECTRIC PRODUCTIMETER

The Durant Manufacturing Company, 1911 N. Buffum St., Milwaukee, Wis., announces the first electrically operated predetermined counter to be offered on the market. Production can be controlled on any electric counting installation to the exact quantities required, thus eliminating losses due to over-runs or under-runs.

This new "SP-MF" predetermined electric counter is constructed like the small "SP" predetermined models brought out by Durant in 1953. They are entirely enclosed for protection against dust and moisture, designed in an up-to-the-minute straight-line motif in attractive tones of silver gray and seal brown. Over-all dimensions are 4⅜" wide by 2⅛" deep and 2⅝" high. Weight is 1¾ pounds. Speed is 600 counts per minute.

Available in either four or five figures, these "SP-MF" models are actuated by electric impulses to close or open a switch at any pre-set count from 1 to 9,999 or 1 to 99,999 respectively. A metal hinged cover provides quick access to the predetermined wheels for easy setting.

This predetermined electric productimeter, brought out in Durant's 75th anniversary year, answers the demand for a compact, accurate, rugged, electrically actuated counter that will fit the dimensional requirements of various installations, such as: light production machinery; packaging, tabulating or addressing equipment; coil winders; machine tools; and conveyor lines.

COMPRESSED AIR DEHUMIDIFIER

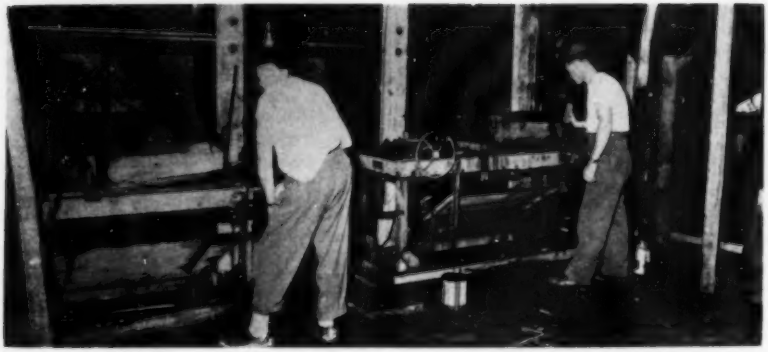
The Vi-Speed dehumidifier, self-cleaning device that purifies compressed air and reduces humidity to a very low dew point, has several new developments of internal design, while the exterior has been streamlined for appearance, strength and safety.

The dehumidifier, manufactured by Van Products Co., 3792 W. 12th St., Lakewood, Erie 2, Pa., has a self-adjusting nozzle coupled with non-clogging aspirator. This automatic control stabilizes unit operation during variable air pressures and volumes for constant removal of injurious liquids, solids and vaporous contaminants.

The baffle surfaces have been enlarged and re-positioned for greater exposure of contaminants to action of "Dryolite," potent drying agent that captures elusive vapors; larger area for separation of heavy impurities and better accommodation of momentary overloads.

"Dryolite," exclusive, self-cleaning drying agent, is compounded to cover a wider range of line temperatures from 100° F. to below freezing. Thus the Vi-Speed, always safe in flammable areas, is more adaptable for processing compressed air under conditions that vary from normal building temperatures to frigid readings, where air is used out of doors.

INCREASE PRODUCTION FOR WEST COAST SHAKE MILL



Using two newly designed shake-splitting machines powered by a General Motors "4-51" Diesel engine, the West Coast Cedar Products Company of Humptulips, Washington is today turning out shakes at a fuel cost less than .4 of a cent per bundle. Before the new machines were installed the shakes were split by hand at costs up to $1.00 per bundle.

In addition to this sharp decrease in operating costs the new equipment has also increased daily production to approximately 500 bundles per day, according to Leny Johnson, general manager of the company.

Records reveal that the two machines, both powered by the one engine, turn out 40 bundles of shakes per gallon of Diesel fuel. Including the operation of two bandsaws the job requires 50 horsepower which is easily delivered by the small, high speed Diesel at 2,400 engine r.p.m.

The machines were designed by the West Coast Cedar Products Company and went into operation several months ago. Evans Engine and Equipment Company of Seattle, made the engine installation.

NEW DELTA FOLDER

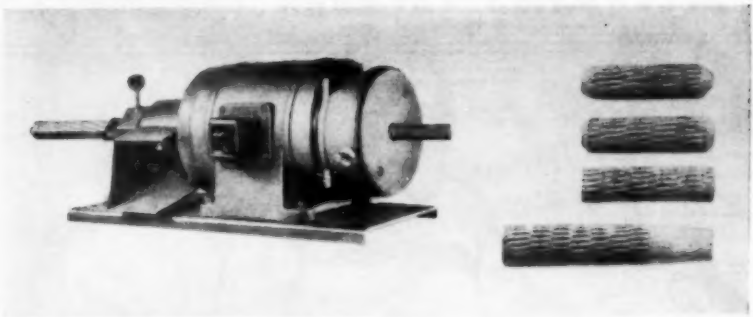
A new condensed specifications folder briefly cataloging all principle Delta tools designed for the woodworking industry has been issued by Delta Power Tool Division of Rockwell Manufacturing Company, 400 N. Lexington Ave., Pittsburgh, Pa.

The piece unfolds to a 17" x 22" sheet with all 14 photo-illustrated tool descriptions neatly arrayed on one side so that the opened folder may be used as a wall chart.

The photo-illustrated text on the reverse side points out eight specific advantages of Delta woodworking tools. Tools described in the folder are Delta 10" and 12" tilting arbor saws, tilting table saws, 6" and 8" jointers, 14" and 20" band saws, 24" scroll saws, 14" and 17" drill presses, 12" lathes, 12" abrasive disc finishing machines, 6" abrasive belt finishing machines, 7" bench grinder, 13" x 5" thickness planers, saw-jointer combination units, wood shapers, and 8", 10", 12-14" and 16-20" radial saws.

Those who have the most to do, and are willing to work, will find the most time

DOWEL MACHINE



A new machine that converts waste wood into cross-hatched dowels is announced by Victor J. Krieg, 611 Broadway, New York 12, N. Y. The "Gnom" doweling machine produces these dowels in a single operation. This rugged precision built, compact machine produces 700 to 1000 feet of cross hatched dowels per hour. With cross-hatched dowels equal distribution of glue flows into cross-hatched crevices causing surface expansion giving added assurance that no motion or slipping occurs between dowel and abutting pieces.

SILICON CARBIDE FACTS

Since its discovery in 1891 by Edward Goodrich Acheson, silicon carbide has been generally known for its widespread use as an abrasive. Available for use as loose grain and in the form of bounded and coated abrasive products, silicon carbide is capable of grinding and polishing a wide range of metallic and non-metallic materials.

In addition to its abrasive applications, however, silicon carbide also possesses some unusual physical and chemical properties, and is finding increasing use in the manufacture of a number of other completely different types of products: super-refractories and refractory cements—where high thermal conductivity or high resistance to abrasion, elevated temperature, chemical attack or thermal shock are needed; electric heating elements—for electric furnaces for temperatures up to 1500°C; resistors—for many types of electrical applications; a deoxidizer in the metallurgy of iron and steel; catalyst carriers and as a porous media.

A 52-page brochure discloses the properties of silicon carbide as related to the above applications and outlines manufacturing techniques. An extensive bibliography is also given.

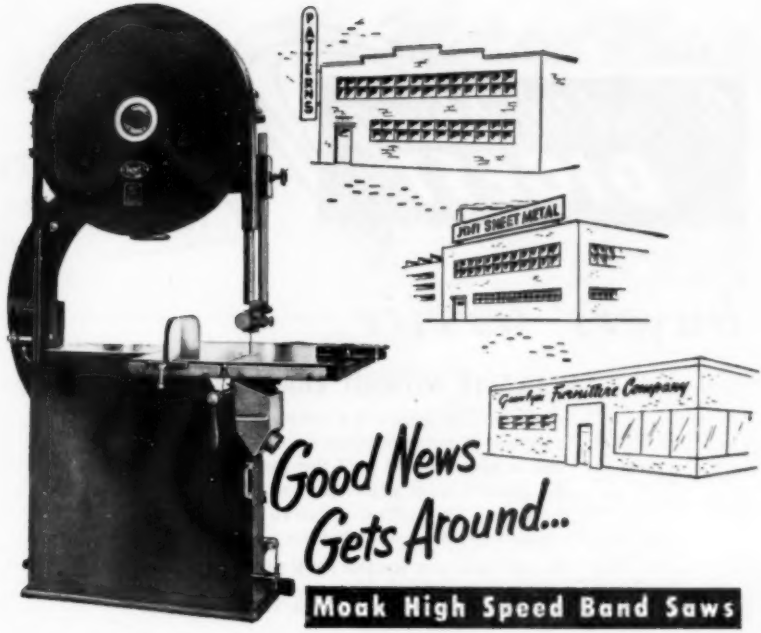
The brochure can be obtained by writing to the Carborundum Company, Niagara Falls, N.Y., attention: Public Relations Dept.

SPORTS KNIFE

To use as an employee prize, this Swiss fishing knife may be just the thing. It is manufactured by Wenger of Switzerland and is available from the Abbeon Supply Co., 179 Jamaica Ave., Jamaica 32, N.Y. In addition to the usual small and large pocket knife blades, it contains scissors for cutting line and tying flies, a blade that is an efficient fish scaler and hook disgorger, a can opener, a screwdriver blade and a hole puncher. All of the blades are of finest Swedish stainless tool steel.

Mechanics Through the Ages

ALTHOUGH
USUALLY MADE OF BRONZE, THE ANVILS OF THE ANCIENT ROMANS WERE VIRTUALLY IDENTICAL WITH THE ONES USED BY MODERN SMITHS.
POPULAR
WITH AMERICAN BLACKSMITHS IN THE EARLY 1800'S WAS THIS HOME MADE PRESS-DRILL...
THE BRACE, WITH ITS BIT, WAS DEPRESSED BY THE WEIGHTED BEAM UNDER WHICH IT WAS FIXED; IT WAS RAISED FROM THE WORK BY PULLING DOWN ON A SECOND LEVER ATTACHED BY A CHAIN TO THE WEIGHTED BEAM.
As early as
THE REIGN OF THE ANCIENT ROMAN EMPEROR CLAUDIUS, THERE WAS A STRONG GUILD OF BLACKSMITHS PLYING THEIR CRAFT IN BRITAIN.



Moak High Speed Band Saws

FOR EFFECTIVE CUTTING OF A WIDE RANGE OF MATERIALS

A standard tool of woodworking shops, Moak High Speed Band Saws are proving their versatility in cutting such materials as pressed and plied boards, plastic laminates, corrugated paper, ferrous and non-ferrous alloys, sheet metals and rolls of glass fibrous material. Functional design includes two-wheel equalized brakes for safety; "Lubricated for Life" bearings to cut maintenance costs. Made in 26" and 36" sizes, available in three drives; also made with a 4-speed transmission.

Get the facts **on Moak Band Saws right away. Write for our colorful booklet.**

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If you will list below the wood-working machines, supplies or machine shop equipment in which you are interested and mail this page to us, we shall be glad to refer your needs to the manufacturers or others in position to serve you. Replies will come from them — not from us.

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Band Saw, New Delta 20" bb. dmd
Band Saw, American 38", bb. v-drive
Blowers, Sturtevant No. 70 & 55"
Borers, Greenlee 360-4 ft. M.D.
Borers, Greenlee No. 370 6 ft. horiz. dmd.
Borers, Moak SS 2 Spdle. horiz. dmd.
Boring & Sawing, McKnight 26F dmd.
Clippers, Coe 38" bd. & motor
Dovetailers, Dodds, 10 & 20 spindle
Frequency changers, 30 KW dmd. and 15 KW.
Glue Jointer, Diehl No. 66 bb. dmd.
Glue Jointer, Jenkins No. 342A bb. dmd.
Jointers, Glue, Yates-American No. 213 bb. dmd.
Jointer, New Moak 12", bb. dmd.
Lathe, Yates No. 74 bb. dmd.
Lathes, Mattison 55C and 57D
Lathe Heads, Mattison Hex. T-slot
Mortiser, Sidney, single spindle pb. bd.
Mortiser, Greenlee No. 228 Vert. bd. & motor
Mortiser, New Britain No. 7, bd. & motor
Mortiser, W&M No. 288—5 spdle. Horiz. dmd.
Moulders, Hermance 7" pb. bd.
Moulders, Mattison No. 222, 6" bb. dmd.
Moulders, Woods No. 107—12" pb. bd.
Moulders, Yates-American C-4—8" bb. & motor
Moulders, Yates-American C-89—6" bb. dmd.
Planer, Facing, Yates-American 36" with Jackson & Church feeder on base, bb. dmd.
Planer, Whitney 36" sgl. rd. hd., bb. dmd
Planers, F&E—30" dbl. pb. bd. & motors
Planers, Berlin 38", rd. hd. dmd
Planers, New Crescent 24" bb. dmd.
Planer, F&E No. 156 36x7 dmd. rd. head
Planer-Matcher, Yates A1-15"x6" rd. hds. pb. bd.
Redrier, Merritt 12 plate 36x72
Routers, Yates American bb dmd
Router, Defiance, 2 spindle bb. dmd.
Routers, Defiance sgl. spdle. high speed. dmd.
Sander, New Jefferson, hand block, bb. dmd.
Sanders, Mattison No. 134, pb. bd.
Sanders, Niagara brush, bb. dmd.
Sander, 48" double disc. dmd.
Sander, Smith 49" 3-drum endless bed. bd.
Sanders, F&E 60" 3 drum roll feed. dmd.
Sanders, McKnight sgl. drum 24"x16" dmd.
Sander, Oakley Model H2, bb. dmd. bd. block
Sander, Porter Cable vert. occ. dmd. sgl. spdle.
Sander, W&M No. 171 belt, bb., md.
Saws, DeWalt, 7½ hp. radial
Saws, Hermance Gang Rip, pb. & motor
Saws, Jenkins 106A dbl. cutoff bb. dmd.
Saws, New Delta-Crescent 12" tilt. arbor, dmd.
Saws, New Multiplex, 40A & 50A
Saws, Skilsaw, 2 hp. sgl. ph. radial
Shaper, Defiance dbl. spdle., bb. dmd.
Shaper, Whitney No. 339, dbl. bb. dmd.
Shapers, New Moak single spindle, bb. dmd.
Shapers, Greenlee No. 180 dbl. bb. dmd.
Shaper, Whitney double spindle, bb., md.
Sticker, American No. 1, 1 side 4" pb. bd.
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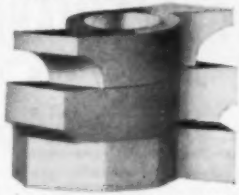

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SAWS—CUT OFF
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American No. 22—14" 4 side

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Crescent No. P 24-24x8" M.D.
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3 HP DeWalt old style

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Fay & Egan Hand Block 3 HP
Yates-American No. 401—43" Motor drive
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Root D280 4-ft. hyd. horizontal multiple

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DOVETAILER
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Diehl No. 60 Cont. Feed Glue Jointer
American 20" with 4-Post Feeder, M.D.

LATHES
Imperial Auto. Turning, D.M.D.

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Wysong & Miles No. 284 P.F. Hollow Chisel
New Britain No. 2 Chain Saw Mortiser, M.D.
Enterprise Ball Brg. Pulley Mortiser, M.D.

PLANERS
Yates No. 152, 24" Single Head, M.D.
Buss No. 4-A 36" Single Head, D.M.D.

SANDERS
Smith No. 481, 42" 3-Drum Endless Bed
Fay & Egan 48" 3-Drum Endless Bed
Sheboygan 48" 3-Drum Endless Bed, B-B
Nash No. 65 Automatic Turning Sander
Wysong & Miles No 173 Universal belt
Peerless 20-in. vertical belt sander, 5 H.P.

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Hermance No. 2M comb. saw, B-B, direct M.D.

SAWS - CHAIN FEED - SELF-FEED
American No. 25 Chain Feed Rip, D.M.D.
Hermance No. 300-G Self-Feed, B-B, M.D.

SHAPERS
Porter No. 200 SVM Single, M.D.
Whitney No. 165 single, direct motor driven
Jones-Superior No. 105 Double End Serpentine
Onsrud W-123 auto, with frequency set

TENONERS
Hermance No. 22M All-Elec. Single End
Colladay-Power-Fay & Egan Single End

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GRUPP 25-in. Hyd. Feed Lock Corner Machine

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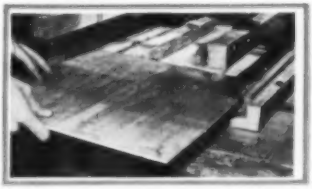

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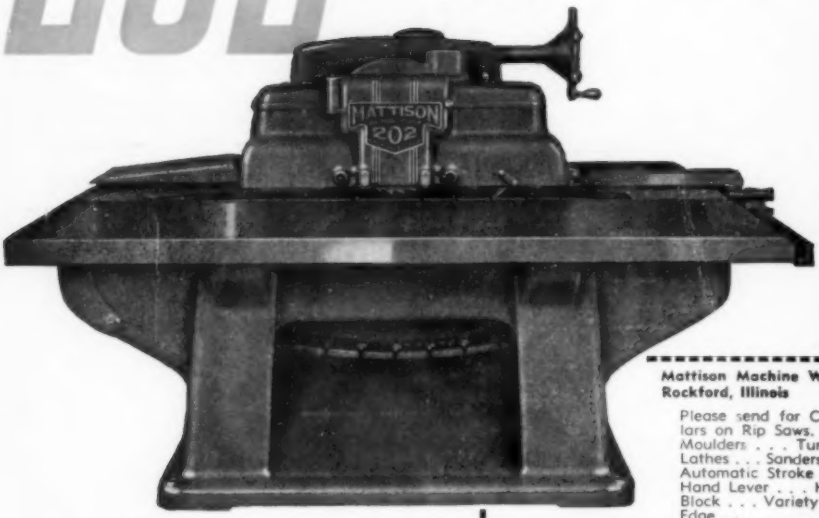

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